

1991

Curriculum-Oriented CAI Based On Instructional Technology To Be Used For Teaching Secondary School Students Introductory Library Skills

Theresa K. Toohil

Nova University, ttoohil13@aol.com

This document is a product of extensive research conducted at the Nova Southeastern University [College of Engineering and Computing](#). For more information on research and degree programs at the NSU College of Engineering and Computing, please click [here](#).

Follow this and additional works at: http://nsuworks.nova.edu/gscis_etd



Part of the [Computer Sciences Commons](#)

Share Feedback About This Item

NSUWorks Citation

Theresa K. Toohil. 1991. *Curriculum-Oriented CAI Based On Instructional Technology To Be Used For Teaching Secondary School Students Introductory Library Skills*. Doctoral dissertation. Nova Southeastern University. Retrieved from NSUWorks, Center for Computer and Information Sciences. (885)
http://nsuworks.nova.edu/gscis_etd/885.

This Dissertation is brought to you by the College of Engineering and Computing at NSUWorks. It has been accepted for inclusion in CEC Theses and Dissertations by an authorized administrator of NSUWorks. For more information, please contact nsuworks@nova.edu.

CURRICULUM-ORIENTED CAI BASED ON INSTRUCTIONAL TECHNOLOGY
TO BE USED FOR TEACHING SECONDARY SCHOOL STUDENTS
INTRODUCTORY LIBRARY SKILLS

by
THERESA K. TOOHL
LINDENHURST SENIOR HIGH SCHOOL

A dissertation presented to Nova University in
partial fulfillment of the requirements
for the degree of Doctor of Science

Nova University
Center for Computer and Information Sciences
Ft. Lauderdale, FL
1991

ACKNOWLEDGMENTS

The author wishes to express sincere appreciation to Dr. Marlyn Kemper Littman, committee chairperson; Dr. George Fornshell, committee member; and Dr. Patricia Labbe Kistenmacher, committee member, for their patience and their encouragement. Special thanks are also due to my husband, John Toohil, for his proofreading abilities and his continuing support.

ABSTRACT

In 1990, the New York State Education Department presented a syllabus that required the teaching of curriculum-oriented library skills and suggested the use of computers to be integrated with the teaching of these skills whenever possible. Schools in New York State are now trying to implement the suggestions in the syllabus. Many authors of educational articles have written at length concerning the incorporation of computer-assisted instruction (CAI) into the classroom, but clear directions have not been provided in the literature for the design or implementation of the necessary software.

The purpose of this study was to design a program based on a CAI model to be used for teaching secondary school students introductory library skills. The skills were integrated with the educational curriculum. The CAI design was based on the instructional technology of Gagne and Merrill; and it was implemented in the code of a specific introductory library lesson.

The program was statistically evaluated using three matched groups of ninth-grade students at Lindenhurst Senior High School in Lindenhurst, New York. The total number of participants was 105 with 35 students in each instructional group: CAI, traditional, and control. The statistical tests used were analysis of covariance and t-tests based on the results of the analysis of covariance.

The design developed in this study for educational software based on current learning theory was shown to be as educationally effective as teacher-centered instruction. Results demonstrated that implementation will facilitate efficient use of educational time and money in the secondary school environment.

TABLE OF CONTENTS

	Page
Acknowledgments.....	ii
Abstract.....	iii
Chapter	
I. Introduction.....	1
Background.....	3
Statement of the Problem.....	6
Subproblems.....	6
Hypotheses.....	7
Limitations.....	8
Assumptions.....	9
Definition of Terms.....	10
Summary.....	13
II. Review Of The Literature.....	15
Introduction.....	15
Computer Usage.....	15
Effective Implementation of Computer Instruction.....	16
Individualization of Instructional Software.....	18
Specific Needs of Library Media Specialist.....	20
Summary.....	21
III. Procedures and Methodology.....	23
Needs Analysis.....	23
Goals, Objectives, and Strategies.....	25

TABLE OF CONTENTS (continued)

Chapter	Page
III. Procedures and Methodology (Continued)	
CAI Design.....	27
Design Implementation.....	29
Programming Language.....	30
Experimental Design.....	38
IV. Results.....	43
Evaluation.....	44
Testing the Hypotheses.....	46
V. Discussion, Implications, and Recommendations.....	50
Hypothesis 1.....	50
Hypothesis 2.....	51
Hypothesis 3.....	51
Implications.....	52
Recommendations.....	54
References.....	57
Appendices	
A. Typical Schedule For A Secondary Librarian.....	64
B. New York State curriculum for English at the ninth-grade level.....	65
C. A Synthesis of Library Skills with Related Learning Outcomes.....	67
D. The Programming Code for the CAI Developed for this Study.....	69
E. Posttest (identical in content to pretest).....	135
F. The Statistical Analysis.....	136

TABLE OF CONTENTS (continued)

	Page
Biographical Sketch.....	144
Figures	
1. Instructional Design For Library CAI.....	31

LIST OF TABLES

Table	Page
1. Ninth Grade Learning Ability: School Designated.....	40
2. ANCOVA Summary.....	45
3. T-test Summary.....	48

CHAPTER I

Introduction

The draft for a syllabus for secondary library media and information skills (grades 7-12) was distributed in 1986 by The University of the State of New York and the State Education Department (The University of the State of New York [USNY], 1986) in accordance with the Board of Regents' Action Plan to Improve Elementary and Secondary Education Results in New York (p. 33). In 1990, the final guidelines (USNY, 1990) were delivered to schools in New York State which are now trying to implement the suggestions in the syllabus. This implementation, mandated at the 7th and 8th grade level and requested at the 9th through 12th grade level, would require one period of study per week in specified, curriculum-oriented areas. These classes may be taught by library media specialists or classroom teachers (USNY, 1990, p. 29).

It is also suggested in the Secondary Media and Information Skills Syllabus that the use of computers, integrated with subject matter, be introduced whenever possible (USNY, 1990, p. 19). The use of computer-assisted instruction (CAI) is encouraged in this syllabus, yet the State Education Department does not include guidelines for the development or purchase of educational software.

Encouraging effective integration of computers and curriculum, thereby making the computer a useful adjunct to current modes of education, seems to be the central theme of many educational leaders (Dalton & Hannafin, 1988, p. 27; Flouris, 1989, p. 14; Caissey, 1990, p. 42; Merrill, Li, & Jones, 1990b, p. 26). Utah State University, a leader in instructional technology, has received funding for several projects relating to instructional design (Merrill, 1990); the topic for its first

Instructional Design Institute in July of 1989 was "Computer-Based Tools for Instructional Design." The fifty participants came from the United States, Canada, and The Netherlands (Merrill, 1990, p. 6). In a recent issue of a journal for high school administrators, Betty Collins and Michael E. Martinez (1989) strongly advocated the use of the computer to teach subject skills, but stated that fewer than 20 percent of the students in grade 11 had ever used CAI in English, science, or social studies classes.

Not only are administrators being called on to rethink directions for effective computer use, but articles written by and for those working in the classroom are seeking integration of computers and curriculum. Mary Alice Anderson (1989), a media specialist in Minnesota, stressed that the utilization of computers in the 1990s will be different from that of earlier decades. She stated, "Computers (like other gadgets) are most effective when used to support the existing curriculum" (p. 35).

Even though these authors have written at length concerning the incorporation of CAI into the classroom, they present no guidelines for how to do so effectively. Many educators state new directions for computer use and the need to proceed with these new approaches, but little clear direction is provided for the design or implementation of the necessary software (Twitchell, 1991, p. 37). That there is a varied technological basis for today's software is evidenced by the multitude of available authoring languages and techniques (Hazen, 1987, p. 156; IBM, 1991, pp. 81-85); but, though the supply of these packages continues to increase, they are not always used to best advantage. Yang (1987) stated this concern when he wrote, "One of the most significant weaknesses of past CAI studies is the lack of theoretical bases. Without a well constructed theory, CAI studies can only be randomly, blindly conducted and their contribution to instruction is therefore trivial" (p. 14).

The purpose of this study was to design a program based on a CAI model to be used for teaching secondary school students introductory library skills that are integrated with the educational curriculum. The CAI design was based on the instructional technology of Gagne and Merrill. It was implemented in the code of a specific introductory library lesson. The program was statistically evaluated using three matched groups of ninth-grade students at Lindenhurst High School in Lindenhurst, New York.

Background

There are many difficulties involved with implementing the Regents Action Plan (USNY, 1990, p. 30) as it relates to the teaching of library skills. The most vital consideration is that of allocating the required personnel from a library staff limited in numbers and restricted by the time available per student. According to the guidelines for implementing the new syllabus in secondary library media and information skills, the Commissioner's Regulations 91.1 and 91.2 require one certified full-time librarian for each 1,000 pupils in New York State (USNY, 1990, p. 36). The Regents' Action Plan (USNY, 1990, p. 31) requires on the 7th and 8th grade level, and suggests on the 9th through 12th grade level, the teaching and reinforcing of skills so that the time requirement would amount to one period per week for each student.

With approximately thirty students per class, implementation of the regulations would require seven teaching periods a day. These seven teaching periods would be supplemental to the existing schedules of most library media specialists. The existing schedules include support for the individual teacher and student, enrichment of classroom activities, and management of library and staff.

Although the New York State Secondary Library Media and Information Skills Syllabus (USNY, 1990, p. 31) maintains the concept of the library and its staff serving the entire school population and remaining flexible to the needs of the entire school body, the one librarian mandated by the state for each 1,000 students (p. 36) would find it very difficult to provide each of these students with one hour of instruction in addition to the curriculum assistance now given. (See for instance a typical schedule for a secondary librarian in Appendix A).

The State Education Department encourages subject teachers to assist in the instruction of library skills (USNY, 1990, p. 30), but classroom teachers have their own required curriculum to cover and have little extra time to give to the teaching of library skills. The New York State curriculum for English at the ninth-grade level is shown in Appendix B. Each year of a major course (English, mathematics, science, social studies, second language) constitutes a unit of study. As described in the New Part 100 of the Commissioner's Regulations (USNY, 1986, p. 34), the time required for each unit of study is 180 minutes of instruction per week or 36 minutes per day. In most schools, the average daily class period allotted for administrative and teaching purposes ranges from 43 to 45 minutes, which leaves little time for additional instruction.

Another problem for the group taught by standard teacher-centered instruction is that one teacher cannot provide individualized feedback to an entire class. As stated by Caissey (1989), "skills must be deliberately taught and then practiced in a manner appropriate to the student grade and ability level" (p. 42). The need for individualizing group instruction was also brought to this investigator's attention by The Regents' Statement of Goals (USNY, 1990) when it affirmed its

belief that children differ and "therefore, we must provide considerable choice and flexibility for each student together with basic requirements" (p. 21).

One means of following the New York State Education Department recommendations of curriculum-oriented instruction in information science would be to integrate the teaching of library skills with specific references using CAI. Electronic delivery could provide an individualized approach for supplementing library instruction. The use of the computer, an existing support device, was suggested by the Secondary Library Media and Information Skills Syllabus (USNY, 1990, p. 19); but there were no suggestions in the New York State library syllabus for effective computer use or for lesson design.

Even though computers running CAI offer a potential means of meeting the challenge imposed by New York State, no clear model for educationally sound CAI exists at present (Dean, 1989, p. 280; Fons, Mason, and Smith, 1989, p. 473; Braden, 1991, p. 54). As stated by Ronni Rosenberg (1987) who was with the Laboratory for Computer Science at MIT:

Despite inadequate models and questionable test results, the literature is full of highly favorable conclusions about computer-aided instructional systems of all kinds....A computer-based educational system based on a compelling underlying model of tutoring and learning could be considered a genuine contribution to both education and Artificial Intelligence. (p. 7)

Rosenberg's statement in 1987 was echoed in 1990 by Tennyson (1990a, p. 16) and Merrill (1990, p. 5). Both learning theorists express a current need to have CAI based on a clear model of learning.

The Statement Of The Problem

The library in Lindenhurst Senior High School, Lindenhurst, New York is located in two areas on different floors of the high school building. At the time of this study, there were also two computer labs for which this investigator (as one of the two library media specialists) had assumed responsibility. As one of the two professional library staff members, it was often necessary to teach from five to ten classes per day in either of the two libraries or the two labs. The subject teacher assisted, but the primary lesson remained the responsibility of this investigator. The two librarians in Lindenhurst Senior High School had difficulty meeting the diversified needs of approximately 1900 students on four grade levels (nine through twelve) and 135 professional staff members in four different locations.

During each school year it was necessary to introduce new library materials and skills, but it was also necessary to renew and refresh the students' ability to use standard library tools, such as the Readers' Guide to Periodical Literature. These standard skill lessons consumed time which could have been apportioned to lessons requiring the specific skills of a research librarian. Many students, who required the professional librarian's guidance to locate information specific to their inquiry, had to be neglected. The problem posed for this study was to develop an effective means for introducing library and information science skills to secondary students in a school library with a staff limited in numbers and restricted by the time available per student.

The Subproblems

1. The First Subproblem. The first subproblem was to introduce an instructional design for CAI which would be applicable to the teaching of curriculum-

oriented, information science skills. This design was based on the principles of Gagne and Merrill, two leading instructional design theoreticians (Merrill et al., 1990a, p. 7); the school library media program taxonomy of Loertscher (1988, pp. 150-153); and the New York State Secondary Library Media and Informational Skills Syllabus (USNY, 1990, pp. 3-15).

2. The Second Subproblem. The second subproblem was to write the code for a specific piece of CAI relating to library skills based on the design principles of Gagne and Merrill. It was necessary that the program be translatable to many types of hardware so that it would be appropriate to the learning environments of a large number of high school students.

3. The Third Subproblem. The third subproblem was to evaluate the efficacy of the design of the specific CAI program being used to teach introductory library skills. The specific subproblem posed for this study was to determine if CAI based on two current instructional design theories was equal to or more effective than teacher-centered procedures when used to teach students the skills required for locating articles in the Reader's Guide to Periodical Literature.

The Hypotheses

1. The First Hypothesis. The scores of the group taught by CAI based on two current instructional design theories will be higher than the scores of the group taught by traditional teacher-centered instruction.

2. The Second Hypothesis. The scores of the group taught by CAI based on two current instructional design theories will be higher than the scores of the group that received no instruction.

3. The Third Hypothesis. The scores of the group taught by traditional teacher-centered instruction will be higher than the scores of the group that received no instruction.

The Limitations

The instructional design of Robert M. Gagne has been used as a basis for the structures and ideas of many modern authors of articles concerned with the design of computer-assisted instruction (CAI), including Fons, Mason, and Smith (1989); Patterson and Bloch (1987); Bangert-Drowns and Kozma (1989); Yang (1987); Bonner (1987); Flouris (1989); and Merrill (Twitchell, 1990b). Because Gagne's Conditions Of Learning has appeared so often and is considered a classic in the field, the design of curriculum-oriented CAI that was developed for this study was based on this learning technology. As a supplement to Gagne's theory, the work of Merrill was also used. Merrill's Component Display Theory was partially based on the work of Gagne (Twitchell, 1990b, p. 36), and it was used to extend and define the application of Gagne's instructional design theory. M. David Merrill is a contributing editor of Educational Technology, a Professor of Instructional Technology, and the Director of the Second Generation Instructional Design Research Program at Utah State University (Merrill et al., 1990b, p. 36).

The program was designed to run on IBM compatible computers using PC/PILOT supplemented with advanced graphics routines from Washington Computer Services. PC/PILOT requires a minimum of 128K and a monochrome monitor (Kheriaty, 1985, 1-1), but program implementation on hardware with small amounts of RAM restricts the use of graphics. The ability of the CPU to support a graphic display is also necessary for interesting and effective graphics routines.

Supersets of the PILOT programming language can be purchased for use on the elementary Apple IIe (Apple Computer, Inc., 1982) or the more sophisticated hardware available in some schools. PILOT Authoring and Presentation Systems sold by IBM Corporation is designed to be used with videodisc and touch-screen technology (Blakeney, 1990, p. 68). MacPILOT from Washington Computer Services is available for an Apple Macintosh. Only one language (PC/PILOT) was used for this study, but the PILOT code for the curriculum-oriented CAI design can be ported to other machines in schools with differing hardware.

The study was restricted to measuring success in subjects' ability to apply skills as evidenced by the rates of increase in the scores on a pre- and a posttest (Appendix F). The objective of the lessons (CAI and teacher-centered) was: Given the Reader's Guide to Periodical Literature, the student will identify four elements necessary for locating a specific article in a periodical by filling in the appropriate blanks in a periodical request form. The written test measured the students' ability to identify the four elements necessary for locating a specific article in a periodical. It was necessary for the student to fill in the appropriate blanks in a periodical request form similar to the form currently used in the library. The test request form was accompanied by copies of identical pages from the Reader's Guide to Periodical Literature. According to Gagne, Briggs, and Wager (1988); "Validity is assured when the assessment procedure results in measurement of the performance described in the objective" (p. 244).

Assumptions

The First Assumption. The first assumption was that certain common elements can be extracted from the work of well-known educational theorists which can be used to produce an instructional model applicable to the teaching of

curriculum-oriented, information science skills. Gagne's instructional design has been widely used (Schaefermeyer, 1990, p. 9) and the applications of educational theory (behavioral and cognitive) by Gagne and Merrill, to instructional design, have certain elements in common (Twitchell, 1990a, p. 34; Gagne & Merrill, 1990, p.23). These applications have been received by educators and programmers with growing interest (Merrill et al., 1990a, p. 7).

The Second Assumption. The second assumption was that CAI, based on a model that uses common elements of instructional design, can be written for use with limited hardware (IBM XT clones). Schools vary in available funding and administrative views; they also vary in the sophistication of available hardware. According to the most recently available report by the U. S. Congress (1988), "The installed base of technologies in the schools today is not powerful enough to run some of the more sophisticated software applications produced by advanced research" (p. 179). The availability of federal funds to support technology at the high school level has not been increased for 1990 (Dallas, 1990).

The Third Assumption. The third assumption is that the two modes of instruction (computer-centered and teacher-centered) will include the same basic information. The content will vary only by its method of delivery: computer or teacher. The lesson presented to the experimental (CAI) group and to the group taught by standard teacher-centered instruction will be similar in fact content. The two lessons will differ in available feedback and learner control.

Definition Of Terms

Assessment. Verification that learning has occurred (Gagne, 1985, p. 255).

Average. Those students in the study placed by the school in "regents" classes.

Attitude. Internal states that influence the individual's choice of action (Gagne, 1985, p. 219).

Behavioral Theory. A branch of psychology which studies behavior without reference to consciousness or mental processes (Chaplin, 1985, p. 51).

CAI. An abbreviation for computer-assisted or computer-aided instruction

Cognitive Theory. A psychological view that stresses purpose, knowing, understanding, and reasoning in behavior (Chaplin, 1985, p. 85).

Deductive Sequencing. Generalities before specifics (Reigeluth & Curtis, 1987, p. 196).

Feedback. Communication to the learner concerning the correctness of the response (Gagne, 1985, p. 254).

Gagne's Nine Events of Instruction. Gain attention, objectives, prior learning, stimulus, guidance, performance, feedback, assessment, and retention and transfer (Twitchell, 1990a, pp. 35-37).

General. Those students in the study placed by the school in "skills" or remedial classes.

Gifted. Those students in the study placed by the school in "gifted and talented" or "honors" classes.

Guidance. See "learning guidance".

ICAI. An abbreviation for intelligent computer-assisted instruction.

Inductive Sequencing. Specifics before generalities (Reigeluth & Curtis, 1987, p. 196).

Intellectual Skill Performance. A user is asked to apply rule or concept to new examples (Twitchell, 1990a, p. 36).

Interface. The section of the program where human beings and computers meet to communicate with each other (Dumas, 1988, p. x).

Learning Guidance. Transfer of information into a form in which it can be stored in long term memory (Gagne, 1985, p. 311).

Learning Outcome. One of a variety of learned capabilities: intellectual skill, cognitive strategy, verbal information motor skill, and attitude (Gagne, 1985, p. 67).

Learning Theory. Formulation of laws and conditions of learning (Chaplin, 1985, p. 155).

Motor Skills. The coordination of muscular movements (Gagne, 1985, p. 197).

Objectives. That part of the lesson which informs the learner of the objective of the instruction (Gagne, 1985, p. 246).

Performance Objectives. Specific learning outcomes expected (Reigeluth & Curtis, 1987, p. 181).

Response. Demonstration by learner or newly acquired capability (Gagne, 1985, p. 254).

Retention and Transfer. The ability to remember newly acquired material for long periods of time and which then can be applied to similar situations (Gagne, 1985, p. 255).

Sequencing. The ordering of the primary components of a lesson (Reigeluth & Curtis, 1987, p. 196).

Stimulus. Presentation to the learner of the essential situation which motivates instruction (Gagne, 1985, p. 251).

Storyboard. A panel or series of panels on which is a set of small rough drawings depicting consecutively the important changes of scene and action (Gove, 1976, p. 2253).

Summary

The central theme of many educational leaders (Dalton & Hannafin, 1988, p. 27; Flouris, 1989, p. 14; Caissey, 1990, p. 42; Merrill, Li, & Jones, 1990b, p. 26) and the recommendations of the New York State Education Department (USNY, 1990) encourage effective integration of computers with the educational curriculum in high school libraries. The use of the computer as an adjunct to current modes of education has been widely discussed, but practical designs for educationally effective software are not generally available (Twitchell, 1991, p. 37).

The library in Lindenhurst Senior High School, Lindenhurst, New York is located in two areas on different floors of the high school building. At the time of this study, there were also two computer labs for which this investigator (as one of the two library media specialists) had assumed responsibility. During each school year it was necessary to introduce new library materials and skills. It was also necessary to renew and refresh the students' ability to use standard library tools, such as the Readers' Guide to Periodical Literature. It was difficult to meet the diversified needs of approximately 1900 students on four grade levels (nine through twelve) and 135 professional staff members in four different locations. The problem posed for this study was to develop an effective means for introducing library and information science skills to secondary students in a school library with a staff limited in numbers and restricted by the time available per student.

The first part of the study introduced an instructional design for CAI that would be applicable to the teaching of curriculum-oriented, information science skills. This design was based on the principles of Gagne and Merrill, two leading instructional design theoreticians (Merrill et al., 1990a, p. 7); the school library media program taxonomy of Loertscher (1988, pp. 150-153); and the New York

State Secondary Library Media and Informational Skills Syllabus (USNY, 1990, pp. 3-15).

The second part of the study involved the coding for a specific piece of CAI relating to library skills based on the design developed for the study. It was necessary that the program be translatable to many types of hardware so that it would be appropriate to the learning environments of a large number of high school students. PC/PILOT supplemented with advance graphics routines was chosen as the programming language. Supersets of the PILOT language are available for many types of computer hardware.

The third part of the study evaluated the efficacy of the design of the specific CAI program that was used to teach the introductory library skills. The specific subproblem posed for this study was to determine if CAI based on two current instructional design theories was equal to or more effective than teacher-centered procedures when used to teach students the skills required for locating articles in the Reader's Guide to Periodical Literature.

CHAPTER II

Review Of Literature

Introduction

There has been a growing tendency in the past decade to shift the emphasis from the question of the efficacy of CAI as a teaching tool toward the efficacy of CAI implementation (Fons et al., 1989). Although research concerning the effectiveness or lack of effectiveness of CAI flourished in the 1970s and early 1980s (Levine & Wiener, 1975; Crenshaw, 1982; Newman, 1983; Ojeda, 1984), and some educators still debate the issue of CAI use (Iacovou, 1987), it is now generally accepted to be at least as effective a teaching alternative as standard classroom instruction (Kozma, 1987, p. 21).

Computer Usage

According to a study done by Becker (1987), there were an estimated one million plus computers in K-12 schools in the United States in 1987. A report issued in 1989 by the National Governors' Association (Koerner, 1989) stated that, on the average, there was a 22 percent increase in the number of computers per student from 1988 to 1989 with a ratio of 1 computer to 25 students. This accelerating trend toward more computers being available for student use seems to be continuing into 1990 as evidenced by specific schools. The Parkway Middle School of Fort Lauderdale, Florida has one computer to every two students and intends to have a one-to-one ratio in 1991. One-half of these computers will be designated for CAI use (McCarthy, 1990, p. 28).

In Section 7: Learning Media Services of the National Study of School Evaluation (1987, p. 453), the guide for Middle States high school evaluation in

1990, it was stated, "The nationally recognized trend is to unify library, audiovisual, computer and other electronic services into a single administrative unit." In an article in Electronic Learning, McCarthy (1990) stated that "the library/media center is beginning to rival the computer lab as a locus of educational technology" (p. 26).

Effective Implementation of Computer Instruction

Computers can now be found in most educational institutions, and because many administrators believe that technology teaches (Dean, 1989, p. 280), educators are now directing their concern toward effective implementation of these potentially exciting electronic tools. Shuell and Schaefermeyer (1990) suggested that "Specific ways in which valid principles of learning and instruction can best be utilized by educational software provides an interesting and important challenge for educational researchers, classroom teachers, and programmers alike" (p. 147). This concern for effective computer use was also expressed by Gail A. Caissey (1989) when she stated that "educators at all levels need to review the existing curriculum to determine where and how these 'new basics' [the use of computers] might be taught and integrated" (p. 45).

Ojeda's (1984) finding, that the teacher's knowledge of CAI and his or her dedication to that technique encouraged achievement, was only one aspect of the effectiveness question. Another obstacle to CAI reaching its full potential as a teaching tool occurs when educators adapt CAI to the perceived delivery techniques rather than structuring the delivery systems (authoring languages) to benefit from the full potential of the computer (Martin, 1988, p. 323). Dr. Martin of Washington University summarized the current emphasis that educators are putting on the need for a solid theoretical foundation for computer use in this statement:

The challenge for the next decade of using microcomputers in instruction will be to persuade decision-makers in school districts to continue to supply the technical support, training and incentives to teachers that will encourage them to move beyond their present delivery style and take advantage of the unique capabilities of the computer. The challenge for researchers will be to provide the theoretical rationale and the practical models that will facilitate this higher level of implementation of microcomputers for instruction by school districts. (Martin, 1988, p. 226)

In New York State, the Division of Elementary and Secondary Education Planning's Bureau of Technology Applications (1989) has been developing a Long Range Plan for Technology in Elementary and Secondary Education which is designed "to effectively integrate emerging technology applications within curriculum areas and programs during the next decade" (p. 1). The future of computer use as an educational tool depends upon how this concern is met; software development has not kept pace with hardware development (Schwarz & Lewis, 1989) and many teachers are dissatisfied with current courseware and presentation design (Carrier & Sales, 1987). In a report completed by Komoski in 1984 (p. 247), the Educational Products Information Exchange (EPIE) found only 5% of the software products it reviewed to be of truly high quality. By 1988, the percentage of outstanding programs was reported to be 7% (Owston & Dudley-Marling, 1988). If the earlier report is used for comparison purposes, the growth of "quality programs" does not seem to be proceeding very quickly. According to these reports, the existing computers are educationally functional, but most of the available programs are not.

Individualization of Instructional Software

Many education authorities (Feldhausen, 1985; Patterson & Bloch, 1987; Schwartz & Lewis, 1989) emphasize the need for evaluative guidelines. Bangert-Downs and Kozma (1989, p. 242) go further; they stress the need to review prospective courseware in relation to the student using it and to the course being taught. These two authorities caution the program user to be aware of seemingly well-designed CAI that might actually be harmful to some students; the student or subject approach might have an erroneous bias. Even the most current software guide (USNY, 1988) sold by The State Education Department of New York cautions the teacher to examine the recommended programs in relation to their suitability to the intended students and to the instructional programs.

If it is necessary to evaluate in relation to the user and to the subject matter, it is also necessary to design with specific users and subject matter in mind. According to Yang (1987), curriculum-directed, flexible software is only in its first stages of design. Hazen (1987) recommended the development of instructional software because of the lack of availability of "suitable, efficient and effective instructional software" (p. 156). She stated that though this is not a cost-effective alternative, it is often the only alternative for educators who wish to use CAI that satisfactorily meets student needs.

Even though there has been no extensive work in the design of flexible software to meet the needs of individual students in specific curricula, new directions in software design have been encouraged by colleges and universities (Junkala, 1991, p. 15). M. C. Lee (1988) explained the importance of intelligent computer-assisted instruction (ICAI) which would interact with the student and would facilitate the teacher's ability to input data for specific needs. The same problem was addressed by Jung-Shing Yang (1987), a graduate student of the University of Southern

California, Los Angeles. He strongly supported "individualized" instruction (instruction tailored to the needs of a particular learner) and examined the history and attributes of intelligent CAI (ICAI). In an article by Collins and Gore (1987), a university course involved in program design for secondary school teachers was described. The article stressed the importance of instructional materials tailored to student needs. Brian D. Monahan (1987) gave details of the degree of Master of Science in Educational Computing at Iona College, New York that allows a specialization in educational software design. His article dealt with the use of different authoring languages as well as the Andrew System at Carnegie Mellon which allowed teachers to develop very sophisticated software.

Individualized software, supportive of specific needs, is not in widespread use at the present time (Twitchell, 1991, p. 37). Its capability of being used as an effective instructional tool can only be judged from available reports of experiences with individual packages. Studies using non-differentiated CAI programs found these programs to be as effective as traditional instructional methods (Kozma, 1987, p. 21), but studies employing personalized, directed CAI design found that those programs had a positive effect on the student's learning. The studies of Levine and Wiener (1975) and Ross (1987) attempted the development and design of personalized software with good success. The software discussed by Levine and Wiener simulated human dialog in imitation of a teacher, referring to the student by name. The subject matter presented material directly from the studied curriculum.

The Ross paper described the development and evaluation of several CAI designs for learning how to solve mathematics word problems by individualizing packages according to the students' background and interests. The first of the two studies was conducted with fifth and sixth grade students who were studying the division of fractions. Students were randomly assigned to three CAI test groups in

which personalized, concrete, or abstract contexts were used as background themes for word problems. The second study was similar to the first using computer-generated print versions of the personalized materials. Comparisons with standard instructional materials showed significantly higher achievement for the students using the personalized lessons.

An experiment involving CAI with a much broader population was reported by Dean (1989) in his discussion of the PLATO system. This CAI package, used by more than 3000 universities, proved to be more successful than traditional teaching methods in its initial tests. Although, in this situation, teaching was more effective using the computer, there was still no strong underlying theory "as to which technologies should be applied, how they should be applied, and what the expected outcomes of these applications should be" (p. 280).

Specific Needs of Library Media Specialist

One of the responsibilities that is commonly thrust upon a high school library media specialist is the ordering of software to meet curriculum demands. The teacher will often make suggestions as to subject content, but he or she may ask for assistance when choosing between programs that appear to be similar. For this purpose, the following selection aids are available: general vendor catalogs, such as those from Follett and Highsmith (both of which are designed to meet the specialized software needs of librarians); comprehensive software guides such as the Educational Software Preview Guide (USNY, 1988); DIALOG's product evaluation database or Magazine Index; and the MENU guide series (A MENU Information Directory for Apple II Computers, 1989; A MENU Information Directory for IBM PC & Compatibles, 1989). These guides may offer applicable software names and descriptions which seem to meet the needs of the various disciplines, but provide no

definitive model of educational software effective for different learners in varying learning situations.

Specific software packages that relate to library skills can also be found in these guides, but there are only a few which might meet the specific needs of the librarian required to introduce reference skills integrated with specific curriculum. Many of the studies mentioned have shown that commercial and non-commercial software programs have been integrated effectively into a wide variety of disciplines, but no available studies were found to show the integration of curriculum, information science, and CAI. The integration of these three educational areas would address the needs of the secondary school librarian in New York State.

Summary

This literature search has shown that some differentiated learning packages and an interest in their development do exist. Information from journal articles, dissertations, conference papers, and books concerning the use and implementation of CAI in educational institutions during the past 10 years was gathered from the following online sources: Information Science Abstracts, ERIC, Library and Information Science Abstracts, NTIS (National Technical Information Service), and INSPEC (Institution of Electrical Engineers, London). Approximately 350 articles were located which related to the use of learning packages designed to meet specialized student needs. None of these articles gave a clear guide for the design of differentiated learning packages.

Some software packages even seem to be associated with curriculum (those listed in the previously mentioned software catalogs), but their quality, usefulness, and appropriateness for integration with a particular curriculum remain in question.

Numerous studies (as evidenced by the papers cited in this study) have also addressed the question of design as an aspect of program effectiveness; but according to Gagne and Merrill (Twitchell, 1991, p. 37; Braden, R. A., 1991, p. 54), there has been no comprehensive theory developed concerning the design and implementation of key elements of effective learning into a functional teaching package.

Librarians implementing the New York State Syllabus (USNY, 1990) and all those integrating curricula and library skills would find it useful to have the means to evaluate or to design software effective for their particular needs. This investigation, resulting in the implementation of a CAI model based on common elements of instructional design theory applicable to the teaching of curriculum-oriented information science skills, could be a useful tool for purchasers, users, and designers of library courseware.

CHAPTER III

Procedures and Methodology

Needs Analysis

As a first step in the procedure, it was important to determine if an instructional solution was the means to follow the directives of the New York State Secondary Library Media and Information Skills Syllabus (USNY, 1990). Kaufman and Thiagarajan (1987) suggest that investigation of the following areas would answer this question (p. 132).

Superordinate Discrepancies. According to the guidelines for implementing the new syllabus in secondary library media and information skills, the Commissioner's Regulations 91.1 and 91.2 require one certified full-time librarian for each 1,000 pupils in New York State (USNY, 1990, p. 36). The Regents' Action Plan requires on the 7th and 8th grade level, and suggests on the 9th through 12th grade levels, the teaching and reinforcing of skills so that the time requirement would amount to one period per week for each student (USNY, 1990, p. 31).

With approximately thirty students per class, implementation of the regulations would require seven teaching periods a day. These seven teaching periods would be supplemental to the existing schedule of most library media specialists which consists of individual teacher, student, and classroom support as well as library and staff management. Although the New York State Secondary Library Media and Information Skills Syllabus (USNY, 1990) maintains the concept of the library and its staff serving the entire school population and remaining flexible to the needs of the entire school body (p. 31), the two librarians mandated by the state to serve approximately 1900 students (p. 36) in Lindenhurst High School find it very difficult or impossible to provide each of these students with one hour of instruction in addition to the curriculum assistance now given (Appendix A).

Environmental Discrepancies. The number of computers, available to students, continues to grow (Martin, 1988, p. 212; Shuell & Schueckler, 1989, p. 135; Turner, 1990, p. 9), but there is no standard computer designated by New York State for classroom use. Each district governs its own purchases and the choice of hardware is determined by budget and by individual preferences (U.S. Congress, 1988, p. 223). Those computers that are available can vary from the Apple IIe (64K to 128K) and IBM compatible (128K to 640K) to the Macintosh and MS-DOS machine with more available memory (640K+). More sophisticated hardware would have higher resolution graphical displays interfaced with videodisc and touch-screen technology. A videodisc player allows the use of laser optical discs that contain up to fifty-four thousand frames per side that can be viewed in still or motion format (Pioneer Communications of America, 1990, p. 5). The program designed for this study was able to function effectively on the less sophisticated MS-DOS computers (CGA) available to the students in Lindenhurst High School; it would also be suitable for use on machines with higher resolution (EGA and VGA) graphic displays.

Motivational Discrepancies. Interactive CAI has been found to be an effective teaching device in many disciplines; it relates to learning experiences familiar to most high school students who are comfortable with and interested in the use of interactive learning based on video displays (Dalton & Hannafin, 1988, p. 31; Turner, 1990, p. 9; Reiser, 1987, p. 39). The use of CAI is a positive motivational device for most Lindenhurst students. It was this investigator's experience, as supervisor of the Apple Lab in that high school, that even classes with a history of disruptive behavior were well behaved in the computer lab.

Skill And Knowledge Discrepancies. The need to effectively integrate library media and information skills with the secondary curriculum was demonstrated in the

New York State Board of Regents Action Plan (USNY, 1990, p. 31). Specific directives for accomplishing this integration were suggested in a syllabus for grades 7-12 (USNY, 1990) which was distributed to all secondary schools in New York State. It is the normal policy for the librarians in Lindenhurst to integrate the curriculum of each discipline with the teaching of library skills. It is not possible to accomplish this goal as fully as requested by the syllabus without supplementary means.

Solution. CAI based on current instructional design theory, which would be appropriate for secondary students who are required to master library media and information science skills integrated with curriculum, would allow instruction aimed at the individual student without the need for increasing the professional staff. Instructional design theory as developed by Gagne has been used by many current educational authors (Fons, Mason, & Smith, 1989; Patterson & Bloch 1987; Bangert-Drowns & Kozma, 1989; Yang, 1987; Bonner, 1987; Flouris, 1989; Twitchell, 1990b; Gagne & Merrill, 1990). Merrill's subdivisions of Gagne's five categories of learning (Twitchell, 1990b, p. 36; Merrill et al., 1990a, p. 7) would provide clear direction for the development of a CAI program implementing current learning theory. (Details of this CAI design and its implementation can be found on pages 27-38 of this dissertation.)

Goals, Objectives, And Strategies

<u>Goals</u>	<u>Objectives</u>	<u>Strategies</u>
1. To allow more informed purchase of existing programs.	1. To provide a design for CAI appropriate to the needs of library	1a. The design was based on current instructional learning theory.

students composed
of easily recognized
learning components.

1b. It was developed
using Gagne's
Hierarchical Task
Analysis with addi-
tions from Merrill's
Component Display
theory.

1c. The needs of sec-
ondary level library
students were ad-
dressed through the
use of the library
taxonomy of Loertscher
(1988) and the New
York State library
syllabus (USNY, 1990).

2. To allow
construction
of CAI effective
for library
students.

2. To implement
the CAI design in
software appropriate
for teaching students
library skills using an
MS-DOS version of
PILOT since versions
of the same language are

2a. A program was
written using PC/PILOT
which can be used with
an XT or AT bus and
any color monitor.

2b. A version of the
same program could

available for a variety of platforms. be written in Apple SuperPILOT, MacPILOT, or PILOT Authoring and Presentation Systems by IBM to be used with videodisc and touch-screen technology.

CAI Design

The next part of this process included the production of an instructional design for CAI that is applicable to the introduction of curriculum-oriented, information science skills (Figure 1). This guide for writing library CAI was based on the principles of Gagne and Merrill, two leading instructional design theoreticians (Merrill et al., 1990a, p. 7; Twitchell, 1990a, p. 34; Twitchell, 1990b, p. 36); the school library media program taxonomy of Loertscher (1988, pp. 150-153); and the New York State Secondary Library Media And Informational Skills Syllabus, 7-12: Part 1: Scope and Sequence (USNY, 1990, pp. 3-15).

The first step in the development of the design was to establish the goal: the introduction of curriculum-oriented, information science skills to ninth grade high school students. Having established a general goal, it was then necessary to decide specifically what to teach (Gagne & Merrill, 1990, p. 23). For this decision, a synthesis of library skills from the Loertscher (1988, pp. 150-153) taxonomy and the New York State library syllabus (USNY, 1990, pp. 3-5) was developed (Appendix C). Only those skills or concepts which New York State expects to be taught or reinforced at the senior high school level were included. The user of these guidelines would begin by choosing a specific skill from this skill list. The skills

involved with using the Readers' Guide to Periodical Literature were chosen for this study.

The next step, in the development of the CAI design, required the listing of the concepts, principles, procedures, or facts to be included in the lesson as suggested by Merrill (Twitchell, 1990c, p. 39). Each of the preceding has a different related learning outcome (e.g., intellectual, motor, cognitive, etc.) as derived from Gagne et al. (1988, p. 44). This step is indicated in view of the theories of Gagne and Merrill; both believe it is necessary to differentiate instruction for the achievement of a particular learning outcome (Twitchell, 1990b, p. 36). In this model, the approach to instruction depends on the designated outcome.

The next part of the design required a decision concerning the sequencing of the events of instruction so that the designated learning outcome might be achieved. Components and sequences of instruction differ for intellectual skill performance, verbal performance, motor skills, cognitive strategy, and for attitude modifications (Reigeluth & Curtis, 1987, p. 191). The user is asked to decide between inductive (specifics before generalities) or deductive (generalities before specifics) sequencing. Some experts believe that the merits of the inductive method include greater motivation, more benefit to younger learners, and the facilitation of transfer and long-term retention (Reigeluth & Curtis, 1987, p. 196). The inductive method was chosen for the CAI that was designed for this study because skills involving the use of the Readers' Guide to Periodical Literature are used sporadically making long-term retention a desired benefit.

After the general sequence was determined, it was then necessary to decide which events of instruction to include. The inductive method required the specifics (examples and practice) to come before the generality (rule). The terms "example", "practice", and "rule" came from D. David Merrill's Component Display Theory

(Twitchell, 1990b, p. 38). Gagne's nine events of instruction (gain attention, objectives, prior learning, stimulus, guidance, performance, feedback, assessment, and retention and transfer) (Twitchell, 1990a, pp. 36-38) were used to develop Merrill's compact organization.

The difficulty of lesson content and the students' familiarity with the subject matter were determining factors for the number of times it was necessary to repeat the components (Reigeluth & Curtis, 1987, p. 195). Allowing user control, in the programming, increased the potential for individual variations. Content was then determined by the characteristics of the examples, practice, and generalities. Both Gagne and Merrill believe in content determining lesson components (Twitchell, 1990b, p. 36). Further suggestions were given by Gagne and Merrill in their published works (Gagne, Briggs, & Wager 1988; Merrill, 1988; Gagne & Merrill, 1990) as well as those included in video tapes of an all-day conference held July 10, 1987, at Utah State University (Gagne & Merrill, 1987). These four 90-minute sessions with graphic aids featured both men discussing contrasting and shared elements of their theories. They were edited and published in seven installments of Educational Technology from July 1990 through January of 1991. The ideas of developers of other educational CAI models (Casteel & Johnson, 1989; Dick & Carey, 1985; Flouris, 1989; Jonassen & Hannum, 1987; Tennyson, 1990a; Tennyson, 1990b) were also considered.

Design Implementation

Storyboard. The second part of the dissertation consisted of the development of an introductory skill lesson, based on the educationally centered CAI design. The first step in this development was to create a storyboard illustrating the major

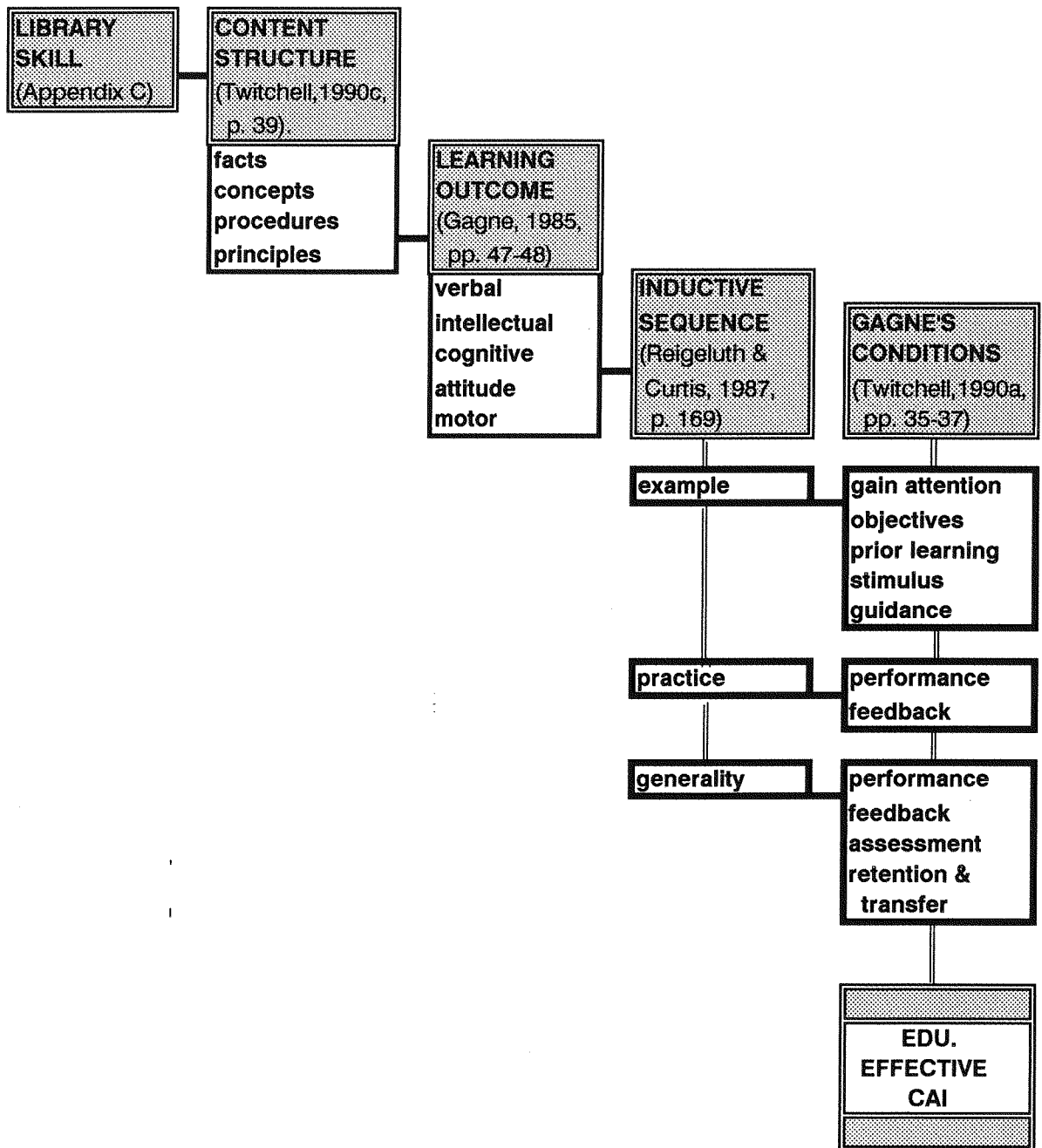
components of the CAI implementation as it relates to teaching secondary students the skills associated with the use of the Reader's Guide to Periodical Literature.

One objective of the storyboard was to provide guidelines for the program coding using specific illustrations. Some areas that required definition before coding could begin were (1) menu selection formats, (2) wording and placement of prompts and feedback messages, (3) general screen layout, (4) specific window design, (5) display formats for graphics, and (6) illustrations of specific graphics (Shneiderman, 1987, p. 392). Much time can be lost in the coding if these areas have not been clarified.

Another storyboard objective was to illustrate the main parts of the program as they function together. DeluxePaint II Enhanced was used for this purpose since it allowed the creation of a storyboard in its Gallery application (a slide show utility). Using this application, it was possible to run the storyboard, manually or automatically, to illustrate the main concepts to be communicated by the CAI. DeluxePaint II Enhanced was also used to provide hard copy of the main graphic sequences of the program.

Programming Language

The implementation of the CAI design was written using PC/PILOT (Version 4.1) and two advanced graphics routines from Washington Computer Services: PIQ (for graphic image compression and special effects) and BSAVER (a screen image capture utility). PC/PILOT was selected because this language can be used to develop CAI that will run on IBM compatible hardware with either an XT or AT bus and any color monitor. This MS-DOS version of PILOT functions at all memory levels of IBM compatibles over 128K and can be used in schools with MS-DOS machines.

Instructional Design for Library CAI

PILOT seemed to be a good choice because it is particularly suitable for writing tutorials and simulations; the cost is low (\$200 for PC/PILOT, \$75 for Apple SuperPILOT, and \$350 from MacPILOT); and the code is similar for a large variety of machines used in education. A very current version of the PILOT language has been introduced by IBM to be run under InfoWindows using videodisc and touch-screen technology (Blakeney, 1990). Even earlier versions of this language, for the more limited software available in many schools, can be made more sophisticated by means of the Link command which allows the inclusion of other programs. Additional routines for PC/PILOT, some of which allow the use of touch-screen technology and/or light pens, can be purchased from Washington Computer Services.

Since the PILOT language is available for a large variety of computers, a version of the same program can be written in Apple SuperPILOT, MacPILOT, or PILOT Authoring and Presentation Systems by IBM. All these programs use essentially the same superset of PILOT commands; this allows those who wish to duplicate the study to verify the results with the existing software in their school. Those who have IBM compatibles can be given run-time versions of the model-based program at no cost. Licensing agreements with Washington Computer Services allow developed programs to be made into encrypted run-time versions in which the programming code is not readable. These encrypted programs can be made available to any group without license violations.

The original PILOT language was developed in the early 1970s (Apple Computer, 1982, p. 2). It contained only eight commands and was designed to be easy enough for the new user to implement. Between the earliest implementations and the present, many revisions and extensions have been made to the language. Common PILOT was developed at Western Washington University by Larry Kheriaty and George Gerhold (Kheriaty & Gerhold, 1978) and is the forerunner of

PC/PILOT, developed by Larry Kheriaty (1985). PC/PILOT contains a limited version of the commands offered by C-PILOT, a UNIX adaptation, (Sumner, 1983, I-13--I-15) except in the area of color and graphics; for these there are extended command sets. Modes 0-6 are allowed for text and graphics on any machine with a graphics card and a color monitor. The three methods of creating graphics are by turtle, image, and sprite. Turtle and sprite techniques can be combined to produce animation that adds to the interest of student tutorials. An advanced feature library allows the use of more sophisticated routines including a screen image capture utility, wipes, fades, slides, graphic compression, the use of a mouse or light pen, and drivers for various video devices. This feature library was utilized in the coding of the program used for this study.

An important feature of all the PILOT language versions is the Match command. Match is a core command that compares the user input to a pattern and affects the program flow. If a match is made, the system will set to "yes" and cause the program to execute the next appropriate step in that lesson; a jump to a label or subroutine may also be programmed depending on the results of the match (Kheriaty, 1985, 2-37--2-40). This command allows program design with very individualized student feedback. Other useful features of PILOT are the use of Link to join small modules which form a flexible, easily revised program and the Keep Records feature in which records of student progress can be recorded (Kheriaty, 1985, 2-36--2-37).

The specific ways in which PC/PILOT was used to produce Gagne's nine events of instruction (Twitchell, 1990a, pp. 36-38) in relation to Merrill's (Twitchell, 1990b, p. 38) more detailed organization are as follows:

Sequence ElementsDesign Techniques1. Provide Example

1a. Gain Attention

1a. Interesting graphics were designed using the capture utility and/or turtle and sprite animation. Blinking, font variety, color variety, intensity, marking with box enclosure, and underlining were also used as attention gaining devices.

1b. Objectives

1b. The learner was provided with an example of the skill to be learned. Each time a specific concept, or example of the concept, appeared the border colors and box colors were consistent. Learner attention was directed by means of brighter fonts.

1c. Prior Learning

1c. Past experiences that related to the present learning situation were recalled. Graphic illustrations of related concepts were shown. The student was asked a question, which related old to new, with a multiple choice or fill-in question. If the answer was correct and a match was made, the system was set to "yes" and caused the program to execute the next appropriate step in that lesson; if not, the program gave a humorous response and reverted to the question. The required exactness of the match varied according to the learning situation.

1d. Stimulus

1d. The skill was divided into specific areas of importance. Blinking, brighter, color-differentiated, or highlighted text was used to focus the learner's attention on the specific item to be communicated.

1e. Guidance

1e. Specific examples of the skill to be gained were given. Screen colors were kept consistent for all the examples. The learner had control over timing. "Enter" brought the next example rather than a specific time span which might not meet the needs of the individual user.

2. Practice

2a. Performance

2a. The learner was now asked to apply the skill to actual practice situations. This was done by means of letter-differentiated or whole answer multiple choice and/or fill-in answer forms. Each screen showed the example in a separate, consistently colored box while the student was requested to make practice choices.

2b. Feedback

2b. The Match command was used to provide response confirmation as in 1c. It also allowed branching to a variety of responses to inaccurate answers so that the student had an enjoyable experience while approaching acceptable responses.

At times the match resulted in a joke or humorous illustration.

2c. Assessment

2c. The learned skill was now applied to less obvious examples. Each screen continued to show the example in a separate, consistently colored box. The Match command was used as in 1c and 2b. Frame timing was user determined by means of the "enter" key. The user also had a menu available by means of the "esc" key so that learning modules could be individualized by repeating or omitting elements.

3. Generality

3a. Performance

3a. The generality or rule for the skill was now summarized in a box of the same color in which the skill example was displayed. The screen demonstrated this box alone until the student pressed the "enter" key. A further example of the rule now appeared for completion by the student. Uncluttered summation screens were also designed for the end of each module.

3b. Feedback

3b. Correctness of the response was now confirmed through the Match command (1c & 2b). The "enter" and "esc" keys were available to the user so that timing and menu choices could be used to allow individual learning paths.

3c. Assessment

3c. The learner was able to demonstrate rule application by means of practice at the end of each small skill group. Correct answers were highlighted. Incorrect answers received a response that suggested the answer and this match caused a jump back to the question.

3d. Retention & Transfer

3d. Each section of the tutorial began and ended with clear, uncluttered summaries of previously learned, related material. The last module of the program was composed of a review (question and answer form) of all covered procedures, concepts, rules, and principles. To differentiate this section from the main body of the tutorial, alternating background and text colors were used. Each correct answer was highlighted and received an approval response. An incorrect one caused the highlighted, correct answer; encouragement; and the menu location of the problem area to appear.

These educational features were used in the MS-DOS program representation of the design. The program functions on CGA, EGA, and VGA monitors. It does not require the use of a mouse and functions with one disk drive. Instructions for its use were very simple since this program was not intended to instruct students in computer usage. The four lines of documentation requested students to (a) put the disk in the drive, (b) turn on the computer, (c) type RG, and (d) press the "enter" key.

Experimental Design

The third part of the study was the evaluation of the implementation of the CAI design by comparing three groups of ninth grade students: those who have used the CAI program developed for this study which assisted students to learn the skills required for the productive use of the Reader's Guide to Periodical Literature; those who have been taught these skills in traditional teacher-centered groups; and those who have had no instruction in these skills at this grade level.

Subjects. The subjects included 105 students (N=105) selected from six 9th-grade library media and information skills classes. Each of the three experimental groups contained thirty-five students composed of approximately equal numbers of boys and girls. The proportion of students used in the study from "general" (below grade level), "average" (at grade level), or "gifted" (above grade level) classes represented the actual distribution of the ninth grade school population (Table 1).

Lesson Description. The lesson encompassed all those skills and concepts required to fill in a request for a magazine article located in the Reader's Guide to Periodical Literature. These included: (a) a periodical index is the place to locate the names of magazine articles, (b) a periodical index resembles a dictionary, (c) the indexing is arranged by subject headings, (d) each item of information under the subject heading has a specific meaning, (e) it is necessary to place the required items in specific places in the request form, and (f) the Reader's Guide to Periodical Literature is only one type of index.

Lesson Versions. The first version of this lesson was CAI in the form of a tutorial. The program was an implementation of the CAI design developed for this study. The subjects in this group met the teacher overseeing the CAI in the computer

lab. They received the pretest on the same day as the lesson and were given the posttest on the following day.

The second version of the lesson was a teacher-centered, traditional lesson incorporating the same lesson components, but without the individualization capabilities of the CAI. These students also received the pretest on the same day as the lesson and were given the posttest on the following day. The third group, who received no instruction, received the pre- and posttest with the other two groups.

Assessment. Skill assessment was determined by grading students in all three groups on their ability to complete five requests on a periodical request similar to that which is used in the Lindenhurst Senior High School. All students used an identical pamphlet prepared by the H. W. Wilson Company (1988, pp. 10-14) to locate sources for the periodical requests. The pre- and posttest (Appendix E) were identical.

Each student was required to locate at least the first three words of the name of an article in a periodical, the name of the periodical (in abbreviated or complete form), the correct date (in abbreviated or complete form), and the page numbers on which this article occurs. It was, also, necessary for the student to place this information into the appropriate place in the periodical request form. Each correct answer was worth five points for a total of 100 points.

Table 1

Ninth Grade Learning Ability: School Designated

GROUP	General	Average	Gifted
Study Population	30	51	24
% of Total Study	0.285	0.485	0.228
9th Grade Population	140	213	79
% of Total 9th Grade	0.324	0.493	0.182

Data Analysis. The experimental data included two continuous data sets with intervals of five and a range of 0 to 100. The data was derived from pre- and posttest scores. Each test had five questions; each question had four parts. Student skill acquisition was evaluated through the use of these two test scores with test administration which included all three groups of students. The pretest was administered in the classroom on the same day the students came to the library or the computer lab for the lesson on the use of the Reader's Guide to Periodical Literature. On the day of the lesson one-third of the students who were present were randomly chosen for the CAI lesson; one-third were taught by the librarian; and the final one-third constituted those who received no lesson. The students in all three groups were given the posttest one to two days after taking the pretest.

The first null hypothesis tested was that there was no statistical difference between the scores of the group taught by the implementation of the CAI design based on current instructional theory and those taught by traditional teacher-directed instruction. The second null hypothesis tested was that there was no statistical difference between the scores of the group taught by the implementation of the CAI design based on current instructional theory and the scores of the group that received no instruction. The third null hypothesis tested was that there was no statistical difference between the scores of the group taught by traditional teacher-directed instruction and the scores of the group that received no instruction.

This study took place in the Lindenhurst Senior High School: an educational setting where it is not possible to select subjects totally at random. The students in each group were taken from six specific classes. The appropriate statistical test in this situation was analysis of covariance (ANCOVA) because it makes allowances for the effects of uncontrolled variables (Issac & Michael, 1989, p. 183). Leedy (1989, p. 223) also suggested that the best statistical method to use with the pretest-

posttest control group design is ANCOVA; the posttest means were compared to the pretest means (covariate). The level of significance was set at .05.

The F-ratio of the ANCOVA only indicates if significant differences in the posttest scores exist (Table 2 and Appendix F). It does not indicate between which groups these differences might occur. Before beginning the analysis of the variations between the individual groups, it was necessary to test for assumptions (Appendix F) concerning the covariance model (1990, Wildt & Ahtola, p. 27). The adjusted group means were then calculated so that t-values based on the covariates could be determined (Table 3 and Appendix F). These t-values were used as the statistical indicators of the effectiveness of the CAI program based on recognized learning technology.

CHAPTER IV

Results

Purpose of Study

The purpose of this study was to compare the effects of a program design based on a CAI model to be used for teaching secondary school students introductory library skills integrated with the educational curriculum with traditional teacher-centered instruction. The statistical evaluation of the resultant data was used to assess the value of CAI based on recognized learning technology in an educational environment.

Methodology

Model. The first part of the study required the production of a valid instructional design to be used as the basis for the code for a specific piece of CAI relating to library skills. The model design (Appendix D) was based on the principles of Gagne and Merrill, two leading instructional design theoreticians (Merrill et al., 1990a, p. 7), the school library media program taxonomy of Loertscher (1988), and the New York State Secondary Library Media and Informational Skills Syllabus (USNY, 1990).

This model includes five steps with associated tables to assist the user. The tables assist the user to make choices in the following areas: (1) library skills; (2) included concepts, principles, procedures, or facts; (3) learning outcomes; (4) inductive or deductive sequencing; and (5) events of instruction.

Design Implementation. The second part of the study required the development of an introductory skills lesson based on the educationally centered model. PC/PILOT (Version 4.1) and two advanced graphics routines from

Washington Computer Services were used for this purpose. The lesson chosen to be implemented using CAI was the teaching of skills required to use the Reader's Guide to Periodical Literature. The student was not required to have any computer experience; all instruction was included in the program.

Evaluation

Subjects. The third part of this study included the evaluation of the CAI design implementation. Six classes of ninth grade students, ranging from poor achievers to above average, were used for this purpose. Each class was divided into three randomly selected groups: computer-centered instruction, teacher-centered instruction, and no instruction (control). A pretest was given to the entire class just before the students were divided into the three groups; a posttest was given to all the students one to two days later. Those who preferred not to participate or who could not be tested within a 48 hour limit were omitted from the study. The total number of participants was 105 (N=35) with 35 students in each instructional group: CAI, traditional, and control.

Data Analysis. The program was statistically evaluated using analysis of covariance and t-tests based on the results of the analysis of covariance. The analysis of covariance was used to eliminate bias due to group variables that might not be of concern to this study. The data required for the analysis of covariance are summarized in Table 2; the posttest was used as the dependent variable and the pretest as the covariate.

The primary purpose of this study was to compare the effects of a program design based on a CAI model with traditional teacher-centered instruction and with no instruction (control). In statistical terms, the object was to test the hypothesis that

Table 2

ANCOVA Summary

(form from Wildt & Ahtola, 1978, p. 36)

Source of Variation	Sum of Squares and Cross Products			Adjusted Sum of Squares	Degrees of Freedom	Adjusted Mean Square	F-ratio
	XX	XY	YY				
Treatment				4456.26	2	2228.13	5.58
Error	54935.71	26910	53490	40308.26	101	399.09	
Total	55775	28567.14	59396.19				

This F-ratio was significant at the .05 level. ($F_{.05; 2, 101} = 3.12$)

all three teaching methods had equal influence on the dependent variable (the posttest). The hypothesis was tested using an F-ratio and a .05 level of significance. A summary of these calculations is in Table 2 and the full statistical analysis is shown in Appendix F. The F-ratio (5.582997) was significant at the .05 level ($F_{.05;2,101} = 3.12$) and the null hypothesis was rejected. The three different teaching methods were not shown to have an equal influence on the dependent variable (the posttest); they were not shown to be equally effective.

It was necessary to test for assumptions concerning the covariance model before beginning the analysis of the variations between the individual groups (1990, Wildt & Ahtola, p. 27). The first test determined if the effect of the pretest on the posttest results was the same at all levels; it tested the equality of the within group regression coefficients. The calculated F-value was 3.879024. Given this F-value there was no reason to reject the hypothesis of homogeneity of regression (at $\alpha = .10$, $F_{2,99} = 4.86$) and the effect of the pretest on the posttest results appeared to be consistent at all levels (Appendix F).

The second assumption concerning the analysis of covariance to be tested was for the regression coefficients being nonzero. The F-value for this test was 33.02935. Given this F-value the hypothesis that the regression coefficients are zero was rejected (at $\alpha = .05$, $F_{1,101} = 3.94$) and the model was consistent with the observed data. The full statistical analysis is shown in Appendix F.

Testing The Hypotheses

The F-ratio indicated that significant differences in the posttest scores existed. It did not indicate between which groups these differences occurred. The adjusted group means were then calculated so that a t-statistic based on covariates could be determined (Table 3 and Appendix F).

Hypothesis 1--Teacher-centered Instruction Versus CAI. The first set of comparisons involved using the data from groups 2 and 3: pre- and posttest results resulting from the teacher-centered and from the computer-centered instruction. The t-value was calculated to be -0.96995 (Table 3 and Appendix F). For this calculated t-value, the null hypothesis, that there was no significant difference between teacher-centered instruction and CAI, was not rejected ($t_{.05;101}=1.986$). The value -0.96995 fell within the range $-1.986 < -0.96995 < 1.986$. No significant difference was found between teacher-centered and computer-centered instruction.

Hypothesis 2--CAI Versus No Instruction. The second set of comparisons involved using the data from groups 3 and 1: pre- and posttest results resulting from the computer-centered instruction and from no instruction. The t-value was calculated to be -3.21524 (Table 3 and Appendix F). For this calculated t-value, the null hypothesis, that there was no significant difference between CAI and no instruction, was rejected ($t_{.05;101}=1.986$). The value -3.21524 fell outside the range $-1.986 < 0 < 1.986$. A significant difference was found between CAI and no instruction.

Hypothesis 3--Teacher-centered Instruction Versus No Instruction. The third set of comparisons involved using the data from groups 2 and 1: pre- and posttest results resulting from the teacher-centered instruction and from no instruction. The t-value was calculated to be -2.24465 (Table 3 and Appendix F). For this calculated t-value, the null hypothesis, that there was no significant difference between teacher-centered instruction and no instruction, was rejected ($t_{.05;101}=1.986$). The value -2.24465 fell outside the range $-1.986 < 0 < 1.986$. A significant difference was found between teacher-centered instruction and no instruction.

Table 3

T-test Summary

Group Comparison		T-value (Calculated)	T-value (from table) (t .05; 101)	Rejection of Hypothesis
Computer Lesson /Teacher Lesson		-0.96995	1.986	No
Computer Lesson /No Lesson		-3.21534	1.986	Yes
Teacher Lesson /No Lesson		-2.24465	1.986	Yes

The statistical findings showed a greater significant difference between CAI and no instruction than between teacher-centered instruction and no instruction. These findings, though, did not show enough difference between the two modes of teaching to be termed significant.

CHAPTER V

Discussion, Implications, And Recommendations

Discussion

The purpose of this study was to design a program based on a CAI model to be used for teaching secondary school students introductory library skills integrated with curriculum. Students matched by learning ability were randomly divided into three instructional groups: CAI, teacher-centered, and no instruction. All participants were tested before and after their designated lesson. The statistical evaluation of the resultant data was used to assess the value of CAI based on recognized learning technology in an educational environment.

Hypothesis 1--Teacher-centered Instruction Versus CAI. There was a failure to reject the first null hypothesis; it can be said that using CAI and traditional methods of teaching students library skills were equally effective in this study. There was a greater difference between CAI and no instruction than between teacher-centered instruction and no instruction, but there was not enough difference between these two modes of instruction to be statistically significant. This finding can be of great use to the many school systems where time and/or teaching faculty are in short supply.

In the ideal educational setting, instructors would have ample time to encourage each student and to meet individual learning needs. The current trend though toward larger classes (Chira, 1991) creates a situation in which there is less time for the individual student. The statistical results of this study are an indication of the equivalent educational value of CAI based on current learning theory with traditional, teacher-centered instruction when used to teach basic skills.

Hypothesis 2--CAI Versus No Instruction. A comparison of the raw scores of students who learn easily (gifted), with those who have few learning difficulties (average), and those with many problems attaining the skills required by the curriculum (general) showed a consistent gain between pre- and posttest results (Appendix F). The students with greater learning difficulties had lower test results on the pretest, but showed the same amount of gain as those with little or no learning handicap. The computer presented a consistent interface to all students at all times of the day.

The television or computer screen is a contemporary communication device. Most students have spent many years developing the viewing skills necessary for relating to visual media (Turner, 1990, p. 9; Dalton & Hannafin, 1988, p. 31; Reiser, 1987, p. 39). The students involved in the study were generally very pleased to be chosen for the group that was to be involved in CAI. When they actually began to work with the computer program, all disciplinary problems disappeared and each student was totally involved with his or her individual learning process. There was no difference in the behavior between those students who are normally well behaved and those who require much supervision. The three participants who had not completed the CAI package when the class period was finished, asked to remain for the required few minutes necessary for its completion. This mode of teaching appeared to be very acceptable to the students involved.

Hypothesis 3--Teacher-centered Versus No Instruction. A comparison of the raw scores of students who learn easily (gifted and talented), with those who have few learning difficulties (regents), and those with many problems attaining the skills required by the curriculum (general/skills), showed a greater variation between pre- and posttest results (Appendix F). The students on both extremes of the learning

scale did better with CAI. The students in the middle of the learning scale, whose needs were less individualized, scored better on the posttest.

This variation of student grades could be accounted for in several ways. The most obvious reason for the disparity between pre- and posttest results was that the CAI met individual needs more effectively than instruction aimed at an entire group. Those students who wished to move more quickly and those who required a slower pace with review were accommodated.

Another reason for grade deviation, which did not show in the raw scores, is that the effectiveness of teacher-centered instruction depends on the effectiveness of the teacher at one specific time and place. The interpersonal relationship between each class and each teacher differs depending on time of day, week, or even preceding events. If the instructor does not relate to a particular group of students, these students will not have an effective learning environment. The personality of the supervising teacher does not enter as directly into CAI where program design is a more decisive factor.

Implications

The design in this study, for educational software based on current learning theory, was shown to be as educationally effective as teacher-centered instruction. A technique for writing CAI based on current instructional design theory was developed which would be appropriate for introducing library skills. This CAI implementation, developed to meet the needs of one group of users (secondary school librarians teaching students curriculum-oriented skills), will allow more efficient use of educational time and money in institutions where there is a need to use these commodities effectively.

The financial problems in which the country is involved at the present time are reflected in the educational problems of the community. Fitting educational requirements into educational budgets has been an increasing problem for most school districts on Long Island (Henry & Abrams, 1991). Alternate teaching methods, which do not require a time commitment from the available teaching staff, would allow teachers to concentrate on students with particular needs. In the Lindenhurst Senior High School, the staff was cut in March 1991 and again in June 1991. Since the statistical analysis in this study showed that the students are as adequately prepared by CAI as by traditional, teacher-centered instruction when learning library skills, the program developed for the study will be made available to all 9th grade students who will be using the Readers' Guide to Periodical Literature.

The program design can also be implemented for experimental or instructional purposes through the formulation of other curriculum-oriented introductory library lessons for secondary school students. A design is interesting as a theory; but "the translation of theory into a computer program forces a more complete, precise, and internally consistent explication than would be done otherwise" (Merrill et al., 1990b, p. 26).

This design for effective software, which is applicable to teaching students curriculum-oriented information skills, also provides guidelines for the effective purchase of functional library CAI. Software can be unnecessarily expensive when those in charge of purchasing are not aware of the fundamental elements that should be incorporated into CAI functional for a specific student body or curriculum. According to Shuell and Schueckler (1989), "Efforts to evaluate this growing body of software have been numerous. Most of the evaluations, however, focus on technical aspects of the software rather than its instructional effectiveness..." (p. 135).

The success of programming based on educationally sound principles is an indication of a relevant direction for commercial producers of educational software.

Recommendations

The results of this study provide useful directions for library lesson management. The CAI implementation, based on current instructional design, is a useful guide to those who choose the means for developing a responsible approach to teaching students curriculum-oriented information skills and to those who purchase library CAI.

One recommendation, resulting from the study, is that library teachers, individually or in groups, more actively participate in developing software to meet the needs of their student body. There are many authoring packages available (IBM, 1991, pp. 81-85), ranging from simple to quite complex, which would be suitable for the skill level of most users. Library media specialists in different geographical areas, in which there was a consistency of curriculum, could collaborate in writing programs, based on the model in this study, which would be functional for a variety of library skills. The programming burden would be shared by this means and the benefits would be available to all.

Another recommendation is that programs be reviewed before purchase and evaluated using the model developed for this study (see Figure 1) as a guide. The model indicates that the developer of effective CAI should include the following concepts in the software design: curriculum-based skill to be taught, content structure, learning outcome, sequence, and learning conditions. Educationally effective CAI begins with the particular skill to be taught. The skill must then be assessed in terms of Merrill's content structure (facts, concepts, procedures, or principles) (Twitchell, 1990c, p. 39) and its related learning outcome (intellectual,

motor, cognitive, attitude, or motor) as derived from Gagne et al. (1988, p. 44). Consistent sequencing must be evident in the software being evaluated so that the learning outcome can be achieved. Some experts believe that the merits of the inductive method (specifics before generalities) include greater motivation, more benefit to younger learners, and the facilitation of transfer and long-term retention (Reigeluth & Curtis, 1987, p. 169). The inductive method was chosen for the CAI that was designed for this study because skills involving the use of the Readers' Guide to Periodical Literature are used sporadically making long-term retention a desired benefit. Gagne's nine events of instruction (gain attention, objectives, prior learning, stimulus, guidance, performance, feedback, assessment, and retention and transfer) (Twitchell, 1990a, pp. 36-38) are required for the design of the specific instructional modules. They should be evident in a consistent sequence in the educational software being evaluated. Evaluation, based on current educational theory, allows for the effective use of limited monies. When commercial software producers become aware of an informed buyer-base, the programs that are being produced will become more effective.

A specific recommendation of this study is that the supplementary use of educationally sound software be used to teach library skills whenever possible. The use of library skill programs allows for expanded use of library staff. Well designed CAI, also, meets the individualized needs of the student who can better learn at a self-regulated pace in a visual environment with which he or she is familiar.

A more far-reaching and less easily implemented recommendation is that prospective teachers be required to have some educational programming facility. An educator who knows the educational foundations of program design and who can effectively implement that design becomes a person truly in charge: able to control and mold the instructional environment.

Further studies utilizing the program model can also be undertaken; these could lead to improvement in the use of time, personnel, and financial resources. One possible research direction is the creation of additional software packages for teaching required library skills using the model of this study. Refinement and further evaluation of the software model developed in this dissertation would enable creators of library skill software to make a product that would more fully meet the needs of secondary school librarians and possibly educators everywhere.

REFERENCES

- A MENU Information Directory for Apple II Computers. (1989). Pittsburgh, PA: Black Box Corporation.
- A MENU Information Directory for IBM PC & Compatibles. (1989). Pittsburgh, PA: Black Box Corporation.
- Anderson, M. E. (1989, November/December). The computing librarian: making room for tomorrow. The Book Report: The Journal For Junior and Senior High School Librarians, 8(3), 35-37.
- Apple Computer, Inc. (1982). Apple SuperPILOT: Language reference manual. Cupertino, CA: Author.
- Bangert-Drowns, R. L. & Kozma, R. B. (1989, Spring). Assessing the design of instructional software. Journal of Research on Computing in Education, pp. 241-261.
- Becker, H. J. (1987). Using computers for instruction. BYTE, 12(2), 149-164.
- Blakeney, P. (Ed.). (1990, February). MultiMedia courseware catalog. Atlanta, GA: IBM US Marketing & Services.
- Bonner, J. (1987). Computer courseware: Frame-based or intelligent? Educational Technology, 27(3), 30-33.
- Braden, R. A. (1991). Instructional design. Educational Technology, 31(4), 54.
- Bureau of Technology Applications: New York State Education Department. (1989, Fall). Long-range plan for technology in elementary and secondary education. Technology Applications Quarterly, 1(2), 1.
- Caissey, G. A. (Fall, 1989). Skills for the information age. Educational Horizons, LXVIII, 42-45.
- Carrier, C. A. & Sales, G. A. (1987). A taxonomy for the design of computer-based instruction. Educational Technology, 27(10), 15-17.
- Casteel, C. P. & Johnson, L. E. (1989, May). Personalizing reading instruction: A systems model for teachers. Educational Technology, 29(5), 37-40.

- Chaplin, J. P. (1985). Dictionary of psychology (2nd rev. ed.). New York: Dell Publishing Co.
- Chira, S. (1991, May 4). Money's value questioned in schools debate. The New York Times, pp. 1,9.
- Collins, B. & Gore, M. (1987, Winter). Combining software engineering and instructional design principles in a new type of course for educators. Journal of Research on Computing in Education, pp. 104-116.
- Collins, B. & Martinez, M. E. (1989, October). Computers in U.S. and Canadian schools: Have we made progress? NASSP Bulletin, 73(519), 5-9.
- Crenshaw, H. M., II. (1982). A comparison of two computer assisted instruction management systems in remedial math. Dissertation Abstracts International, 43, 11A. (University Microfilms No. AAD83-06839)
- Dallas, S. (1990). Partners in priorities. NYLA Bulletin, 38(1), 5-6.
- Dalton, D. W. & Hannafin, M. J. (1988). The effects of computer-assisted and traditional master methods on computational accuracy and attitudes. Journal of Educational Research, 82(1), 27-32.
- Dean, R. L. (1989, Spring). A model for evaluation of the cost-effectiveness of computer-assisted instruction in a university. Journal of Research on Computing in Education, pp. 277-289.
- Dick, W. & Carey, L. (1985). The systematic design of instruction (2nd ed.). Glenview, IL: Scott Foresman.
- Dumas, J. S. (1988). Designing user interfaces for software. Englewood Cliffs, NJ: Prentice Hall.
- Feldhausen, M. W. (1985). The effects of computer review assistance modules (CRAM) on student achievement in United States history. Dissertation Abstracts International, 47, 1A. (University Microfilms No. AAD86-06961)
- Flouris, G. (1989). The use of an instructional design model for increasing computer effectiveness. Educational Technology, 29(1), 14-21.
- Fons, R. P., Mason, E. J., and Smith, T. A. (1989, Summer). CLOPPE-Educational software integration for effective classroom instruction. Journal of Research on Computing in Education, pp. 473-482.

- Gagne, R. M. (1985). The conditions of learning (4th ed.). NY: Holt, Rinehart and Winston.
- Gagne, R. M. (Ed.).(1987). Instructional technology: Foundations. Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers.
- Gagne, R. M. & Briggs, L. J. (1979). Principles of instructional design (2nd ed.). NY: Holt, Rinehart and Winston.
- Gagne, R. M., Briggs, L. J., & Wager W. W. (1988). Principles of instructional design (3rd ed.). NY: Holt, Rinehart and Winston.
- Gagne, R. M. & Merrill, M. D. (Speakers) (1987). A conversation on instructional design with Dr. Robert M. Gagne & Dr. M. David Merrill (Videotape Recordings of Sessions 1-4 with Graphic Aids) Logan, UT: Utah State University Department of Instructional Technology.
- Gagne, R. M. & Merrill, M. D. (1990). Integrative goals for instructional design. ETR&D, 38 (1), pp. 23-30.
- Gove, P. B. (Ed.). (1976) Webster's third new international dictionary. Springfield, MA: G. & C. Merriam Company.
- Hazen, M. (1987, Winter). Criteria for choosing among instructional software authoring tools. Journal of Research on Computing in Education, pp. 156-164.
- Henry, M. & Abrams, A. (1991, June 15). Poor districts get poorer. Newsday, pp. 5, 12.
- H. W. Wilson Company. (1988). How to use the Readers' Guide To Periodical Literature. Bronx, NY: Author.
- Iacovou, M. S. (1987). Does computer assisted instruction affect the achievement of third graders in library skills? (Master of Arts Thesis). Union, NJ: Kean College of New Jersey. (ERIC Document Reproduction Service No. ED 286 464)
- IBM. (1991, Spring). Multimedia solutions courseware catalog. White Plains, NY: Author.
- Isaac, S. & Michael, W. B. (1989). Handbook in research and evaluation (2nd ed.). San Diego, CA: EdITS Publishers.

- Jonassen, D. H. & Hannum, W. H. (1987, December). Research-based principles for designing computer software. Educational Technology, 27(12), 7-14.
- Junkala, J. (1991). Creating CAI courseware for college-level instruction: almost anyone can do it. Educational Technology, 31(1), 15-20.
- Kaufman, R. & Thiagarajan, S. (1987). Identifying and specifying requirements for instruction. In R. M. Gagne, (Ed.), Instructional technology: Foundations (pp.113-140). Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers.
- Kheriaty, L. (1985). PC/PILOT Language reference manual (Version 4.0). Bellingham, WA: Washington Computer Services.
- Koerner, T. F. (1989, October). This month. NASSP Bulletin, 73(519), V.
- Komoski, P. K. (1984). Educational computing: The burden of insuring quality. Phi Delta Kappan, 66, 244-248.
- Kozma, R. B. (1987). The implications of cognitive psychology for computer-based learning tools. Educational Technology, 27(11), 20-25.
- Lee, M. C.. (1988, Winter). An expert system construction approach to CAI development. Journal of Research on Computing in Education, pp. 129-139.
- Leedy, P. D. (1989). Practical research: Planning and design (4th ed.). NY: Macmillan Publishing Company.
- Levine, D. & Wiener, E. (1975). Let the computer teach it. American Journal of Nursing, 75(8), 1300-1302.
- Loertscher, D. V. (1988). Taxonomies of the school library media program. Engelwood, CO: Libraries Unlimited, Inc.
- McCarthy, R. (1990). The new library/media center. Electronic Learning, 9(8), 25-28.
- Martin, C. D. (1988, Winter). School district implementation of microcomputers for instruction. Journal of Research on Computing in Education, pp. 212-228.
- Merrill, M. D. (1988). Applying component display theory to the design of courseware. In D. H. Jonassen (ed.), Instructional designs for microcomputer courseware. Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers.

- Merrill, M. D. (1990). Introduction to special issue: Computer-based tools for instructional design. Educational Technology, 30(3), 5-6.
- Merrill, M. D., Li, Z., Jones, & M. K. (1990a). Limitations of first generation instructional design. Educational Technology, 30(1), 7-11.
- Merrill, M. D., Li, Z., Jones, & M. K. (1990b). The second generation instructional design research program. Educational Technology, 30(3), 26-30.
- Monahan, B. D. (1987). Can teachers develop their own software? Educational Technology, 27(12), 33-35.
- National Study of School Evaluation. (1987). Section 7: Learning media services. Falls Church, VA: Author.
- Newman, J. S. (1983). A comparison of traditional classroom, computer, and programmed instruction. Dissertation Abstracts International, 44, 4A. (University Microfilms No. ADG83-19301)
- Ojeda, E. (1984). Effectiveness of a computer assisted instruction supported bilingual program for Hispanic students. Dissertation Abstracts International, 45, 3A. (University Microfilms No. AAD84-14520)
- Owston, R. D. & Dudley-Marling, C. (1989). A criterion-based approach to software evaluation. Journal of Research on Computing in Education, 20, 234-244.
- Patterson, A. C. & Bloch, B. (1987). Formative evaluation: A process required in computer-assisted instruction. Educational Technology, 27(11), 26-30.
- Pioneer Communications of America, Inc. (1990, Spring). INTERACTIVE LaserDisc: Technology for interactive teaching and learning. Supplement to THE Journal. Author.
- Reigeluth, C. M. & Curtis, R. V. (1987). Learning situations and instructional models. In R. M. Gagne, (Ed.), Instructional technology: Foundations (pp. 175-206). Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers.
- Reiser, R. A. (1987). Instructional technology: A history. In R. M. Gagne, (Ed.), Instructional technology: Foundations (pp. 11-48). Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers.
- Rosenberg, R. (1987). A critical analysis of research on intelligent tutoring systems. Educational Technology, 27(11), 7-13.

- Ross, S. M. (1987). Computer-based instruction research: Implications for design. (ERIC Document Reproduction Service No. ED 285 558)
- Schaefermeyer, S. (1990). Standards for instructional computing software design and development. Educational Technology, 30(6), 9-15.
- Schuell, T. J. & Schueckler, L. M. (1989). Toward evaluating software according to principles of learning and teaching. Journal of Educational Computing Research, 5(2), 135-149.
- Schwarz, I. & Lewis, M. (1989). Basic concept microcomputer courseware: A critical evaluation system for educators. Educational Technology, 29(5), 16-21.
- Shneiderman, B. (1987). Designing the user interface: Strategies for effective human-computer interaction. Reading, MA: Addison-Wesley Publishing Company.
- Sumner, T. (1983). C-PILOT language reference manual. Sacramento, CA: The PILOT Group.
- Tennyson, R. D. (1990a). A proposed cognitive paradigm of learning for educational technology. Educational Technology, 30(6), 16-19.
- Tennyson, R. D. (1990b). Integrated instructional design theory: Advancements from cognitive science and instructional technology. Educational Technology, 30(7), 9-15.
- Turner, D. (1990, January). Changing perceptions: The computer in the 90s. Computers in Education, 30(6), 9-10.
- Turner, P. (1986). Helping teachers teach. Littleton, CO: Libraries Unlimited.
- Twitchell, D. (Ed.) (1990a). Robert M. Gagne and M. David Merrill in conversation: Reviewing the main points of Robert M. Gagne's learning theory. Educational Technology, 30(7), 34-39.
- Twitchell, D. (Ed.) (1990b). Robert M. Gagne and M. David Merrill in conversation: Reviewing the main points of M. David Merrill's learning theory. Educational Technology, 30(8), 36-41.
- Twitchell, D. (Ed.) (1990c). Robert M. Gagne and M. David Merrill in conversation: An overview of M. David Merrill's new Component Design Theory. Educational Technology, 30(9), 36-42.

- Twitchell, D. (Ed.) (1991). Robert M. Gagne and M. David Merrill in conversation: ICAI, computers in the schools, an instructional design expert system. Educational Technology, 31(1), 34-40.
- U. S. Congress, Office of Technological Assessment. (1988). Power On! New tools for teaching and learning, OTA-SET-379. Washington, DC: U. S. Government Printing Office.
- University of the State of New York: The State Education Department. (1986). Secondary library media and information skills syllabus, 7-12: Scope and sequence/1986 draft. Albany, NY: Author.
- University of the State of New York: The State Education Department. (1987). The 1988 educational preview guide. Albany, NY: Author.
- University of the State of New York: The State Education Department. (1988). English language arts syllabus K-12. Albany, NY: Author.
- University of the State of New York: The State Education Department. (1990). Secondary library media and information skills syllabus, 7-12; Part 1: Scope and sequence. Albany, NY: Author.
- Yang, J. (1987). Individualizing instruction through intelligent computer-assisted instruction: A perspective. Educational Technology, 27(3), 7-15.

APPENDIX A

Typical Schedule for a Secondary Librarian

The library used in this example is an open library: one to which individual students and entire classes may come as the need arises. A typical schedule for a secondary librarian would include (USNY, 1990, pp. 24-26):

1. The acquisition, storage, production, and easy retrieval of resources in a variety of formats.
2. Individual and class guidance to locate available materials easily and to use this information effectively.
3. The creation of an environment to which students and faculty will be attracted to fulfill curriculum requirements and to meet personal interests.
4. The provision of faculty services which support instructional requirements, assist in curriculum development, provide in-service classes for the use of new materials, and promote a professional library.

The time allotted by the librarian for each task would be determined by the immediate requirements of that day. Classes requiring instruction or guidance for current assignments, would receive the first priority.

APPENDIX B

New York State Curriculum for Ninth-grade English

The curriculum for ninth-grade students in New York State is based on the English Language Arts Syllabus K-12 (USNY, 1988). During each school year, the English teacher is expected to include the following objectives within the allotted class time (pp. 27-60):

1. The student will be able to listen and to speak for the purpose of social interaction. As part of this competence, he or she will be able to speak in conversation and in group situations, participate in organizational meetings, and be able to give and to receive messages completely and accurately.

2. The student will be able to listen and to speak so that she or he will be able to acquire information and understanding. These skills would include the ability to (a) give and follow oral directions, (b) hear and repeat essential information, (c) be familiar with patterns of organization in formal presentations, (d) be able to identify vocal characteristics in oral language, (e) recognize levels of language, idiomatic expressions, figures of speech, and verbal and nonverbal cues.

3. The student will be able to listen and to speak so that he or she will be able to analyze and evaluate critically. The areas of analysis will include oral communication, preferences, values, persuasive techniques, and information included in nonprint media.

4. The student will be able to listen and to speak for personal response. This skill would include the appreciation of hearing or telling stories, poetry, and drama.

5. The student will be able to express herself or himself in written form. A variety of compositional products should result from these efforts: a friendly letter,

an autobiographical sketch, a poem, a paragraph of personal feelings, a journal entry, a personal response to literature, literary analysis, a short story, a fable, a folktale, a skit, a script, a formal speech, a humorous article, a business letter, and a letter of factual information, a resume, a research paper, and a book report.

6. The student will read for aesthetic and personal response; for acquisition, interpretation, and application of information; and for critical analysis and evaluation. This process will include reading for enjoyment and for information gathering.

APPENDIX C

A Synthesis of Library Skills with Related Learning Outcomes

(Loertscher, 1988, pp.150-153; USNY, 1990, pp. 3-15)

Library Skill	Learning Outcome
. Task definition 1.1 Fact finding 1.2 Asking-searching 1.3 Examining 1.31 Information analysis 1.32 Comparing different viewpoints 1.33 Recognizing bias	INTELLECTUAL
. Location of materials 2.1 Being able to locate materials using online or paper catalog	INTELLECTUAL & MOTOR
2.2 Information seeking strategies 2.21 Being able to select appropriate materials	COGNITIVE

Library Skill (Continued)	Learning Outcome (Continued)
2.22 Knowing location and arrangement of library materials	VERBAL INFORMATION
3. Use of materials 3.1 Effectively using resources 3.2 Being able to use: 3.21 Available indexes	COGNITIVE
3.22 Specialized reference material 3.23 Vertical file material	INTELLECTUAL
4. Synthesis 4.1 Evaluating 4.11 Comparing different viewpoints 4.12 Recognizing bias 4.2 Concluding 4.3 Conceptualizing	INTELLECTUAL & COGNITIVE

APPENDIX D

The Programming code for the CAI Developed for This Study

The code was developed in two linked parts. There is a Link command at the end of this section of the program (ccguide.pil) that invisibly joins it with cc2guide.pil (p. 119). At the end of cc2guide.pil (p. 134), there is a similar link; this one brings the user to the menu in the first section. It was necessary to divide the coding in this manner because of the size restrictions for the file length in the PILOT editor.

The program was divided into modules which can be located by the following notation: *GUIDE, *HEAD, *ABBREV, *SEE, *ARRANG, *USED, and *CHALLE. Notes explaining the code are written with rem statements (R:).

```
R:Program ccguide.pil
```

```
R:Set up viewports
```

```
D:A$(50),B$(50)
```

```
C:A$="TS:V4,20,4,10;F0;B0"
```

```
C:B$="TS:V32,75,13,21;F0;B0"
```

```
R: Next five lines done ONCE per program that uses PIQSHOW:
```

```
DX: PIQSH$(1700)
```

```
FX: PIQSHOW.BIN
```

```
FI: 0,PIQSH$
```

```
D: PICT$(16200)
```

```
C: PIQSH$(10,5) = OFF(PICT$)
```

```
R: This done to read in the picture file
```

```
FX: CCWEL.PIQ
```

```
FI: 0,PICT$
```

```
R: This done to set display.
```

```
TS:M4;B16;F1
```

```
R: This done to display the image with current parameters:
```

```
C: PIQSH$(3,3) = "E!!" "!!CHR(81)
```

```
C: PIQSH$(6,4) = CHR(1)!!CHR(40)!!CHR(1)!!CHR(25)
```

```
C: PIQSH$(16,3) = "X"!!CHR(1)!!CHR(1)
```

```
V: PIQSH$
```

```
W:40
```

```
R: This done to read in the picture file
```

```
FX: CCRG.PIQ
```

FI: 0,PICT\$

R: This done to set display.
TS:M4;B16;F1

R: This done to display the image with current parameters:
C: PIQSH\$(3,3) = "F"!! "!!CHR(51)
C: PIQSH\$(6,4) = CHR(1)!!CHR(40)!!CHR(1)!!CHR(25)
C: PIQSH\$(16,3) = "X"!!CHR(1)!!CHR(1)
V: PIQSH\$
W:60

R: This done to read in the picture file
FX: CCDEV.PIQ
FI: 0,PICT\$

R: This done to set display.
TS:M4;B16;F1

R: This done to display the image with current parameters:
C: PIQSH\$(3,3) = "I"!! "!!CHR(81)
C: PIQSH\$(6,4) = CHR(1)!!CHR(40)!!CHR(1)!!CHR(25)
C: PIQSH\$(16,3) = "X"!!CHR(1)!!CHR(1)
V: PIQSH\$
W:50

R: Set viewport
TS:V1,38,1,23;B17;F1
D:F\$(14500)
FX:DROP.FMF
FI:0,F\$
NS:F\$
TX:
T:
: During this
:
: lesson
:
TH:
W:40

TX:
T:
: Press ENTER
:
: to continue
:
TH:
W:50

TX:
T: Press ESC
:
: to see

```

:
:           the menu
TH:
W:50

```

R:The following is the menu module.

*MENU

TS:M2;V0,79,0,24;F14;E1

```

T:  -----
:  |   MENU   |
:  -----

```

TS:F15

```

T:
:
:           1. What is the READER'S GUIDE?
:
:           2. What is in it?  SUBJECT HEADINGS
:
:           3. What is in it?  ABBREVIATIONS
:
:           4. What is in it?  SEE & SEE ALSO
:
:           5. How is it ARRANGED?
:
:           6. How is it USED?
:
:           7. Putting it all together. THE

```

CHALLENGE!

```

:
:           E. END PROGRAM
:
:

```

W:5

TS:F13

```

T:
:           SPACE highlights next item
:           Press ENTER on highlighted area or
TH:           1 2 3 4 5 6 7 or E

```

TS:F13;G17,4;A1. What is THE READER'S GUIDE?

R:set up %B FOR THE INS functions below

C:%B="1234567Ee"

*NO1 C:X=KEY(0)

C(X=13):X = ASC("1")

J(INS(CHR(X))):MENUGO

J(X<>32):NO1

TS:F15;G17,4;A1. What is THE READER'S GUIDE?

TS:F13;G17,6;A2. What is in it? SUBJECT HEADINGS

*NO2 C:X=KEY(0)

C(X=13):X = ASC("2")

J(INS(CHR(X))):MENUGO

J(X<>32):NO2

TS:F15;G17,6;A2. What is in it? SUBJECT HEADINGS

TS:F13;G17,8;A3. What is in it? ABBREVIATIONS

*NO3 C:X=KEY(0)

C(X=13):X = ASC("3")

J(INS(CHR(X))):MENU GO

J(X<>32):NO3

TS:F15;G17,8;A3. What is in it? ABBREVIATIONS

TS:F13;G17,10;A4. What is in it? SEE & SEE ALSO

*NO4 C:X=KEY(0)

C(X=13):X = ASC("4")

J(INS(CHR(X))):MENU GO

J(X<>32):NO4

TS:F15;G17,10;A4. What is in it? SEE & SEE ALSO

TS:F13;G17,12;A5. How is it ARRANGED?

*NO5 C:X=KEY(0)

C(X=13):X = ASC("5")

J(INS(CHR(X))):MENU GO

J(X<>32):NO5

TS:F15;G17,12;A5. How is it ARRANGED?

TS:F13;G17,14;A6. How is it USED?

*NO6 C:X=KEY(0)

C(X=13):X = ASC("6")

J(INS(CHR(X))):MENU GO

J(X<>32):NO6

TS:F15;G17,14;A6. How is it USED?

TS:F13;G17,16;A7. Putting it all together--THE CHALLENGE!

*NO7 C:X=KEY(0)

C(X=13):X = ASC("7")

J(INS(CHR(X))):MENU GO

J(X<>32):NO7

TS:F15;G17,16;A7. Putting it all together--THE CHALLENGE!;

TS:F13;G17,18;AE. END PROGRAM

*NO8 C:X=KEY(0)

C(X=13):X = ASC("E")

J(INS(CHR(X))):MENU GO

J(X<>32):NO8

TS:F15;G17,18;AE. END PROGRAM

TS:F13;G17,4;A1. What is THE READER'S GUIDE?

J:NO1

R:to jump to the selected section

*MENU GO

J(X=49):GUIDE

J(X=50):HEAD

J(X=51):ABBREV

J(X=52):SEE

J(X=53):ARRANG

J(X=54):USED

J(X=55):CHALLE

*QUIT
 TS:B0;F7;M2
 T: THANK YOU.
 :PROGRAM ENDED. RETURNING TO DOS.
 E:QUIT

*SYSX
 E:MENU

*GUIDE
 PS:E
 TX: #13You have selected #14THE READER'S GUIDE.
 TS:V15,64,24,24;F7;E7
 TH: #0Please PUSH ENTER to continue or ESC to see Menu

TS:V1,79,1,23;E1
 X:A\$
 TX:
 T: #14WHAT
 :
 :
 : IS
 :
 TH: IT?
 TS:V15,64,24,24;F7;E7
 TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
 P:E
 X:B\$
 TX:
 T: #14TO SEE WHAT IT IS
 :
 :
 :
 : AND HOW IT CAN HELP YOU
 :
 :
 TH: #15PRESS ENTER NOW.

TS:V15,64,24,24;F7;E7
 TH: #0Please PUSH ENTER to continue or ESC to see Menu
 W:200

R: This done to read in the picture file
 P:E
 FX: CC1E2.PIQ
 FI: 0,PICT\$

R: This done to set display.
 TS:M5;B16;F0

R: This done to display the image with current parameters:
 C: PIQSH\$(3,3) = "H"!! "!!CHR(31)
 C: PIQSH\$(6,4) = CHR(1)!!CHR(40)!!CHR(1)!!CHR(12)

C: PIQSH\$(16,3) = "X"!!CHR(1)!!CHR(1)
 V: PIQSH\$

R: This done to read in the picture file

AS:

P:E

FX: C1E3.PIQ

FI: 0,PICT\$

R: This done to set display.

TS:M5;B16;F0

R: This done to display the image with current parameters:

C: PIQSH\$(3,3) = "E"!!"X"!!CHR(31)

C: PIQSH\$(6,4) = CHR(1)!!CHR(40)!!CHR(13)!!CHR(25)

C: PIQSH\$(16,3) = "X"!!CHR(1)!!CHR(13)

V: PIQSH\$

AS:

TS:M2;V0,79,0,24;E7;F7

TX:

TS:V1,78,1,23;E1;F1

TX:

TS:V25,47,9,16;B0;F0

TX:

T: #14TO FIND INFORMATION

: IN MAGAZINES

:

: #15YOU

:

CAN

TH: USE

TS:V15,64,24,24;F7;E7

TH: #0Please PUSH ENTER to continue or ESC to see Menu

W:200

P:E

R: This done to read in the picture file

FX: CCRG.PIQ

FI: 0,PICT\$

R: This done to set display.

TS:M4;B16;F1

R: This done to display the image with current parameters:

C: PIQSH\$(3,3) = "H"!!" "!!CHR(31)

C: PIQSH\$(6,4) = CHR(1)!!CHR(40)!!CHR(1)!!CHR(25)

C: PIQSH\$(16,3) = "X"!!CHR(1)!!CHR(1)

V: PIQSH\$

AS:

P:E

TS:M2;V0,79,0,24;E7;F7

TX:

TS:V1,78,1,23;E1;F15

TX:
T: THE READER'S GUIDE TO PERIODICAL LITERATURE
TH: *****
X:AS\$
TX:
T: #14is a #15GUIDE
:
: #14to information
:
TH: in #15MAGAZINES.
TS:V15,64,24,24;F7;E7
TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
P:E
X:BS\$
TX:
T:
: #14It is a #15GUIDE #14to information
: about a
: #15PERSON,
: PLACE, or
TH: THING.

P:E
TS:V15,64,24,24;F7;E7
TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
P:E
TS:M2;V0,79,0,24;E7;F7
TX:
TS:V1,78,1,23;E2;F15
TX:
T: If you wanted to find INFORMATION IN A MAGAZINE
TH: *****
X:AS\$

TX:
T:
: #14 about
TH: #15 AFRICA

AS:
P:E
P:U
X:BS\$
TS:V32,75,13,19;E0
TX:
T: #14you could use the
: _____ ' _____ #15to PERIODICAL LITERATURE.
:
: #7(Please type in the answer.)
: Press ENTER if you are not sure.
TS:V34,48,15,15;F15

A:
M:READER&GUIDE

TS:V32,75,19,21;E0
TY: #10VERRRRRRRRRRY GOOD!
TN: The answer is READER'S GUIDE.
TS:V34,48,15,15;F15;E15
TH:READER'S GUIDE
J:@P

P:E
TS:V15,64,24,24;F7;E7
TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
P:E
TS:V0,80,0,24;E7;F7
TX:
TS:V1,78,1,23;E3;F15
TX:
T: If you wanted to find INFORMATION IN A MAGAZINE
TH: *****
TS:V4,20,4,11;F0;B0
TX:
T: #14for an English
: composition
: about your
: #15HOBBIES, #14you
: would look in
TH: the...

AS:
P:E
P:U
TS:V30,75,12,22;E0;F0
TX:
T: #14a. magazine room.
: b. Reader's Guide to Periodical Literature.
: c. closest magazine.
:
TH: #7(Please type a, b, or c)

R:Make an answer viewport
TS:V31,75,19,22;F7
TX:
AS:
M: A!B!C
TN:
TN: #15Please answer a, b, or c
TN:
JN:@A

MJ:B
TY: #15GREAT!!!!

TY:
JY:@P

MJ:A
TY: #15But how would you know
TY: which one to choose?
TY: #7Please try again.
J:@A

MJ:C
TY: #15But that one may not have
TY: any information you need.
TY: #7Please try again.
J:@A

P:E
TS:V15,64,24,24;F7;E7
TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
P:E
TS:V0,79,0,24;E7
TX:
TS:V1,78,1,23;E6
TX:
TS:V2,77,2,22;E7
TX:
TS:V4,46,4,20;E0;F0
TS:V4,46,4,12
TX:

T: #14Now suppose you need
: to find #15information about
: the MIDDLE EAST.
:
: #14To find current information
: you will need
: to use #15magazines.

TH:
TS:V15,64,24,24;F7;E7
TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
P:E
P:U
TS:V4,46,14,20;E0;F0
TX: #15To locate the magazines
T: #14about the MIDDLE EAST,
: you would look in the
:
: _____ ' _____ TO PERIODICAL LITERATURE
TH: _____ #7(Please type in the answer.)

TS:V5,46,18,19;F15

A:
MS:READER&GUIDE
T:_____ ' _____ TO PERIODICAL LITERATURE

TS:V54,73,17,20;E0
TY:
TY: #10YOU CERTAINLY
TY: HAVE THAT IDEA!!!!

TN:
TN: #7Please
TN: #14TRY AGAIN

TS:V5,46,18,18;F15
TYH:READER'S GUIDE TO PERIODICAL LITERATURE
JY:@P

JN:RGUIDE
*RGUIDE
GSX:

TS: M4;B17
FX:CCRG.PIQ
FI:0,PICT\$
V:PIQSH\$
W:100

TS:M2;F14
GX:
JN:@-P

P:E
TS:V15,64,24,24;F7;E7
TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
P:E
TS:M2;V0,80,0,24;E5;F5
TX:
T: #15THE READER'S GUIDE TO PERIODICAL LITERATURE
TH: *****

TS:V4,22,4,10;F0;B0
TX:
T: #14LET'S SUM UP
:
: WHAT YOU HAVE
:
TH: LEARNED SO FAR.
TS:V15,64,24,24;F7;E7
TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
P:E

TS:V32,73,13,21;F0;B0

TX:

T: #15THE READER'S GUIDE TO
: PERIODICAL LITERATURE

:

:

:

:

#14IS A #15GUIDE

#14TO #15INFORMATION

#14IN #15MAGAZINES.

TH:

TS:V15,64,24,24;F7;E7

TH: #0Please PUSH ENTER to continue or ESC to see Menu

J:HE1

*HEAD

PS:E

TX: #13You have selected #14SUBJECT HEADINGS.

TS:V15,64,24,24;F7;E7

TH: #0Please PUSH ENTER to continue or ESC to see Menu

*HE1

AS:

P:E

TS:M2;V0,79,0,24;E1;F1

TX:

T: #15THE READER'S GUIDE TO PERIODICAL LITERATURE

T: *****

TH: #13Lesson 2 #14SUBJECT HEADINGS.

X:A\$

TX:

T: #14WHAT

:

:

:

IS #15IN

TH: #14IT?

TS:V15,64,24,24;F7;E7

TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:

X:B\$

TX:

T: #14TO SEE WHAT IS IN IT

:

:

:

:

:

AND HOW IT CAN HELP YOU

TH: #15PRESS ENTER NOW.

TS:V15,64,24,24;F7;E7

TH: #0Please PUSH ENTER to continue or ESC to see Menu

W:200

R: This done to read in the picture file

P:E

FX: CC2AE2.PIQ
FI: 0,PICT\$

R: This done to set display.
TS:M5;B16

R: This done to display the image with current parameters:
C: PIQSH\$(3,3) = "R"!!" "!!CHR(31)
C: PIQSH\$(6,4) = CHR(1)!!CHR(40)!!CHR(1)!!CHR(25)
C: PIQSH\$(16,3) = "X"!!CHR(1)!!CHR(1)
V: PIQSH\$

R: This done to read in the picture file
AS:
P:E
FX: CC2AE3.PIQ
FI: 0,PICT\$

R: This done to set display.
TS:M5;B16

R: This done to display the image with current parameters:
C: PIQSH\$(3,3) = "R"!!" "!!CHR(31)
C: PIQSH\$(6,4) = CHR(1)!!CHR(40)!!CHR(1)!!CHR(25)
C: PIQSH\$(16,3) = "X"!!CHR(1)!!CHR(1)
V: PIQSH\$

R: This done to read in the picture file
AS:
P:E
FX: CC2AE4.PIQ
FI: 0,PICT\$

R: This done to set display.
TS:M5;B16

R: This done to display the image with current parameters:
C: PIQSH\$(3,3) = "E"!!" "!!CHR(31)
C: PIQSH\$(6,4) = CHR(1)!!CHR(40)!!CHR(1)!!CHR(25)
C: PIQSH\$(16,3) = "X"!!CHR(1)!!CHR(1)
V: PIQSH\$

AS:
P:E
TS:M2;V0,79,0,24;B7;F7

TX:
TS:V1,78,1,23;B1;F1
TX:
TS:V16,63,1,1;F0;E0

TX:
TH: #12A SUBJECT can be a PERSON, PLACE, or THING.
TS:V4,25,3,9;B0;F0
TX:
TS:V5,12,4,4;E3;F7

TH: #0PERSON
 TS:V4,25,6,9;E0;F0
 TX: #12BUSH, GEORGE
 : HUSSEIN, SADDAM
 TH: IACOCCA, LEE

TS:V29,48,10,16;B0;F0
 TX:
 TS:V30,36,11,11;E3;F7
 TH: #0PLACE
 TS:V29,48,13,16;E0;F0
 TX: #12AFRICA
 : IRAN
 TH: NEW YORK (NY)

TS:V52,72,17,23;B0;F0
 TX:
 TS:V53,59,18,18;E3;F7
 TH: #0THING
 TS:V52,72,20,23;E0;F0
 TX: #12BLACK HISTORY
 : DEMOCRACY
 TH: PETROLEUM

P:E
 TS:V15,64,24,24;F7;E7
 TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
 P:E
 P:U
 TS:V0,79,0,24;B7;F7
 TX:
 TS:V1,78,1,23;B1;F1
 TX:
 TS:V16,63,1,1;F0;E0
 TH: #12A SUBJECT can be a PERSON, PLACE, or THING.

TS:V4,22,16,17;E0;F0
 TX: #12Would this be a
 TH: SUBJECT HEADING?

TS:V4,23,3,9;B0;F0
 TX:
 TS:V5,12,4,4;E3;F7
 TH: #0PERSON
 TS:V4,23,6,9;E0;F0
 TX: #12 KENNEDY, JOHN
 T:
 : #15yes or no?
 TS:V21,22,8,8;E7;F15
 AS:
 M:%Y%

TS:V24,64,6,9;B1;F1
 TX:
 TN: #15JOHN KENNEDY was a PERSON
 TN: and YOU can find INFORMATION
 TN: about him in the READER'S GUIDE.
 TNH: #7(Please try again.)
 TS:V21,22,8,8;E7;F15
 TNH: N
 JN:@A

TS:V24,64,6,9;B1;F1
 TX:
 TY: #15You are right!
 TS:V21,22,8,8;E3;F15
 TYH: Y
 JY:@P

P:E
 P:U
 TS:V29,48,9,15;B0;F0
 TX:
 TS:V30,36,10,10;E3;F7
 TH: #0PLACE
 TS:V29,48,12,14;E0;F0
 TX: #12 SYRIA
 :
 TH: #15yes or no?
 TS:V46,47,14,14;E7;F7
 AS:
 M:%Y%

TS:V49,78,11,15;B1;F15
 TX:
 TN: SYRIA is a PLACE
 TN: and YOU can find
 TN: INFORMATION about it
 TN: in THE READER'S GUIDE.
 TNH: #7(Please try again.)
 TS:V46,47,14,14;E7;F15
 TNH: N
 JN:@A

TS:V49,78,12,15;B1;F1
 TX:
 TY: #15RIGHT again!
 TS:V46,47,14,14;E3;F15
 TYH: Y
 JY:@P

P:E
 P:U
 TS:V53,73,15,21;B0;F0
 TX:
 TS:V54,60,16,16;E3;F3

TH: #0THING
 TS:V53,73,18,21;E0;F0
 TX: #12DRUG ABUSE
 :
 TH: #15yes or no?
 TS:V71,72,20,20;E7;F7
 AS:
 M:%Y%

TS:V28,52,16,21;B1;F1
 TX:
 TN: #15DRUG ABUSE is a THING
 TN: and YOU can find
 TN: INFORMATION about it
 TN: in THE READER'S GUIDE.
 TNH: #7(Please try again.)
 TS:V71,72,20,20;E7;F15
 TNH: N
 JN:@A

TS:V34,52,18,21;B1;F1
 TX:
 TY: #15VERY, VERY GOOD!
 TS:V71,72,20,20;E3;F15
 TYH: Y

TS:V4,25,16,17;E8;F0
 TX: #12These would be
 TH: SUBJECT HEADINGS.
 W:13
 TS:V4,25,16,17;E0;F0
 TX: #12These would be
 TH: SUBJECT HEADINGS.
 W:100
 JY:@P

P:E
 TS:V15,64,24,24;F7;E7
 TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
 P:E
 P:U
 TS:M2;V0,79,0,24;E2
 TX:
 TS:V2,77,1,23;E7
 TX:
 TS:V3,76,2,22;E2;F2
 TX:
 TS:V15,65,2,21
 TX:
 T:
 : #15If you wanted information about
 : #15you would look in

: THE READER'S GUIDE TO PERIODICAL LITERATURE
 TS:V50,62,4,4;E0;F12
 TH: ADVERTISING

TS:V18,62,9,20;E0;F15

TX:

T: a. for your favorite magazine.

:

: b. under #12ADVERTISING #15(the subject).

:

: c. for something interesting.

TH: (Please answer a, b, or c.)

R:Make an answer viewport

TS:V19,61,17,19;E7;F7

AS:

P:U

TS:V19,61,17,19;E7;F7

M:A!B!C

TN:

TN: #1Please press a, b, or c.

TNH:

JN:@A

MJ:B

TY:

TYH: #4B. VERY GOOD!

JY:@P

MJ:A

TY: #1A. Your favorite magazine might not

TY: have articles about ADVERTISING.

TYH: #8(Please try again.)

JY:@A

MJ:C

TY: #1C. It might be interesting, but

TY: it is not what you need.

TYH: #8(Please try again.)

JY:@A

P:E

TS:V15,65,24,24;F7;E7

TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:

P:E

TS:M2;V0,79,0,24;E7

TX:

TS:V1,78,1,23;E6

TX:

TS:V2,77,2,22;E7

TX:

TS:V4,47,4,15;E0;F0

TX:

T:
: #14If you wanted to find a magazine article
:
: #15about #12AFRICA, #14you would look up the
:
: #15subject _____ #14in THE READER'S GUIDE
:
: TO PERIODICAL LITERATURE.
:

TH: #7(Please type in the answer.)

P:U

TS:V54,73,16,20;E0;F0

TX:

T: #14Please #15TYPE
: #14in the #12SUBJECT
: #14and press #15ENTER

TH:

TS:V14,20,10,11;F15;B0

A:

M:%AFRICA

T:_____

TS:V54,73,16,20;E0

TYX:

TY: #14GOOD!!
TY: You know to start
TY: with the #15SUBJECT.

TS:V14,20,10,11;F12;B0

TY:AFRICA

TYH:-----

JY:@P

TS:V14,22,10,11;B8;F15

TNH:#12AFRICA

JN:@-P

P:E

TS:V15,64,24,24;F7;E7

TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:

P:E

TS:V0,79,0,24;F5;E5

TX:

T: #15THE READER'S GUIDE TO PERIODICAL LITERATURE
: *****

TH:

TS:V4,22,4,10;F0;B0

TX:
 : #14LET'S SUM UP
 :
 : WHAT YOU HAVE
 :
 TH: LEARNED SO FAR.

X:B\$

TX:
 T: #15The READER'S GUIDE
 : TO PERIODICAL LITERATURE contains
 :
 : #141. #15SUBJECT HEADINGS.
 TH: (people, places, things)

TS:V15,64,24,24;F7;E7

TH: #0Please PUSH ENTER to continue or ESC to see Menu

J:ABB1

*ABBREV

P:E

TX: #13You have selected #14ABBREVIATIONS.

TS:V15,64,24,24;F7;E7

TH: #0Please PUSH ENTER to continue or ESC to see Menu

*ABB1

AS:

PS:E

TS:M2;V0,79,0,24;E1;F1

TX:

T: #15THE READER'S GUIDE TO PERIODICAL LITERATURE
 T: *****
 TH: #13Lesson 3 #14ABBREVIATIONS.

X:A\$

TX:

T: #14WHAT

:

:

:

TH: #14IT?

AS:

P:E

TS:V1,78,1,23

X:B\$

TX:

T:

:

:

:

:

:

TH:

TS:V15,64,24,24;F7;E7
 TH: #0Please PUSH ENTER to continue or ESC to see Menu
 W:400

R: This done to read in the picture file
 P:E
 FX: CC2BE2.PIQ
 FI: 0,PICT\$

R: This done to set display.
 TS:M5;B15

R: This done to display the image with current parameters:
 C: PIQSH\$(3,3) = "E"!! "!!CHR(41)
 C: PIQSH\$(6,4) = CHR(1)!!CHR(40)!!CHR(1)!!CHR(25)
 C: PIQSH\$(16,3) = "X"!!CHR(1)!!CHR(1)
 V: PIQSH\$

R: This done to read in the picture file
 AS:
 P:E
 FX: CC2BE3.PIQ
 FI: 0,PICT\$

R: This done to set display.
 TS:M5;B15

R: This done to display the image with current parameters:
 C: PIQSH\$(3,3) = "F"!! "!!CHR(21)
 C: PIQSH\$(6,4) = CHR(1)!!CHR(40)!!CHR(1)!!CHR(25)
 C: PIQSH\$(16,3) = "X"!!CHR(1)!!CHR(1)
 V: PIQSH\$

R: This done to read in the picture file
 AS:
 P:E
 FX: CC2BE4.PIQ
 FI: 0,PICT\$

R: This done to set display.
 TS:M5;B16

R: This done to display the image with current parameters:
 C: PIQSH\$(3,3) = "R"!! "!!CHR(21)
 C: PIQSH\$(6,4) = CHR(1)!!CHR(40)!!CHR(1)!!CHR(25)
 C: PIQSH\$(16,3) = "X"!!CHR(1)!!CHR(1)
 V: PIQSH\$

R: This done to read in the picture file
 AS:
 P:E
 FX: CC2BE4B.PIQ
 FI: 0,PICT\$

R: This done to set display.

TS:M5;B16

R: This done to display the image with current parameters:

C: PIQSH\$(3,3) = "F"!! "!!CHR(31)

C: PIQSH\$(6,4) = CHR(1)!!CHR(40)!!CHR(1)!!CHR(25)

C: PIQSH\$(16,3) = "X"!!CHR(1)!!CHR(1)

V: PIQSH\$

R: This done to read in the picture file.

AS:

P:E

FX: CC2BE5.PIQ

FI: 0,PICT\$

R: This done to set display.

TS:M5;B15

R: This done to display the image with current parameters:

C: PIQSH\$(3,3) = "D"!!CHR(1)!!CHR(31)

C: PIQSH\$(6,4) = CHR(1)!!CHR(40)!!CHR(1)!!CHR(25)

C: PIQSH\$(16,3) = "X"!!CHR(1)!!CHR(1)

V: PIQSH\$

AS:

P:E

P:U

TS:M2;V0,79,0,24;E7;F7

TX:

TS:V1,78,1,23;E1;F1

TX:

TS:V15,62,1,2;E7;F0

TX: Let's look up some #14ABBREVIATIONS #0in

TH: THE READER'S GUIDE TO PERIODICAL LITERATURE.

TS:V26,53,4,11;B7;F0

TX:

T: #14Abbreviations

:

: #0ed editor

: il illustration

: p page

: por portrait

: O October

P:E

TS:V15,64,24,24;F7;E7

TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:

P:E

P:U

TS:V22,57,11,11;E3;F3

TXH: #15Please fill in the answers.

TS:V15,62,12,20;B7;F7

TX:

TS:V23,25,14,14;E0;F0
 TH: #14il
 TS:V23,25,17,17;E0;F0
 TH: #14O
 TS:V30,62,14,20;B7;F7
 TX: #15is the abbreviation for
 T: _____
 :
 : #15is the abbreviation for
 TH: _____

TS:V15,64,23,23;E1;F1
 TX:

TS:V31,43,15,15;B7;F14
 A:
 MS:ILLUSTRATION

TS:V64,78,13,16;E7;F7
 TN: #15Please look
 TN: at the
 TN: #14abbreviations
 TNH: #15and TRY AGAIN

TS:V31,63,15,15;B7;F7
 TNH: _____
 JN:@-P

TS:V64,78,13,16;E1;F1
 TX:
 TS:V64,75,15,15;E15;F0
 TX:
 TYH: VERY GOOD!
 TS:V31,43,15,15;F7
 TYH:#14ILLUSTRATION
 W:10

TS:V64,75,15,15;E7;F0
 TYH: VERY GOOD!
 TS:V31,43,15,15;B7;F7
 TYH:#14ILLUSTRATION

JY:@P

P:E
 P:U
 TS:V31,38,18,18;B7;F14
 A:
 M:OCTOBER

TS:V64,78,17,20;E7;F7
 TN: #15Please look
 TN: at the
 TN: #14abbreviations

TNH: #15and TRY AGAIN

TS:V31,63,18,18;B7;F7

TNH:#15 _____

JN:@-P

TS:V64,78,17,20;E1;F1

TX:

TS:V64,72,18,18;E15;F0

TX:

TYH: GREAT!!!

TS:V31,38,18,18;F7

TYH:#14OCTOBER

W:10

TS:V64,72,18,18;E7;F0

TYH: GREAT!!!

TS:V31,38,18,18;B7;F7

TYH:#14OCTOBER

JY:@P

P:E

TS:V15,64,24,24;F7;E7

TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:

P:E

P:U

TS:M2;V0,79,0,24;E7

TX:

TS:V1,78,1,23;E2

TX:

TS:V11,64,2,3;E0;F0

TX: #14You have done very well. Now we can look at more

TH: difficult #15ABBREVIATIONS in the READER'S GUIDE.

TS:V11,64,5,11;E0;F0

TX:

T: #14Ag August

Ja January

: Ap April

Je June

: Aut Autumn

Jl July

: bibl bibliography

p page

: il illustration

por portrait

TH:

P:E

TS:V15,64,24,24;F7;E7

TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:

P:E

P:U

TS:V21,54,13,13;E0;F0

TH: #15WHAT IS THE ABBREVIATION?

TS:V21,54,15,22;E0;F0

TX: #15Autumn #14 ____
 T: #15portrait #14 ____
 : #15page #14 ____
 : #15July #14 ____
 : #15January #14 ____

TS:V23,51,21,21;E7;F7

TXH:#0(Please fill in the answers.)

TS:V41,44,15,15;B0;F14

A:

M:%AUT%

T: ____

TS:V58,72,13,16;E7;F7

TN: #15Please look

TN: at the

TN: #14ABBREVIATIONS

TNH: #15and TRY AGAIN

JN:@-P

TS:V58,72,13,15;E7;F7

TY: #15GOOD!

TY: #14Now try

TYH: the next one.

TS:V41,44,15,15;B0;F0

TH:#15Aut

JY:@P

JN:@-P

P:E

P:U

TS:V41,44,16,16;B0;F14

A:

M:%POR%

T: ____

TS:V58,72,13,16;E7;F7

TN: #15Please look

TN: at the

TN: #14ABBREVIATIONS

TNH: #15and TRY AGAIN

JN:@-P

TS:V58,72,13,15;E7;F7

TYX: #15GOOD!

TY: #14Now try

TYH: the next one.

TS:V41,44,16,16;B0;F0

TH:#15por

JY:@P

JN:@-P

P:E
P:U
TS:V41,44,17,17;B0;F14
A:
M:%P%
T:_

TS:V58,72,13,16;E7;F7
TN: #15Please look
TN: at the
TN: #14ABBREVIATIONS
TNH: #15and TRY AGAIN
JN:@-P

TS:V58,72,13,15;E7;F7
TYX: #15GOOD!
TY: #14Now try
TYH: the next one.
TS:V41,44,17,17;B0;F0
TH:#15p
JY:@P

P:E
P:U
TS:V41,44,18,18;B0;F14
A:
M:%JL%
T:___

TS:V58,72,13,16;E7;F7
TN: #15Please look
TN: at the
TN: #14ABBREVIATIONS
TNH: #15and TRY AGAIN
JN:@-P

TS:V58,72,13,15;E7;F7
TYX: #15GOOD!
TY: #14Now try
TYH: the next one.
TS:V41,44,18,18;B0;F0
TH:#15Jl
JY:@P

P:E
P:U
TS:V41,44,19,19;B0;F14
A:
M:%JA%
T:___

TS:V58,72,13,16;E7;F7
TN: #15Please look
TN: at the

TN: #14ABBREVIATIONS
 TNH: #15and TRY AGAIN
 JN:@-P

TS:V58,72,13,15;E7;F7
 TYX: #4GOOD!
 TY: You really
 TYH: have the idea.
 TS:V41,44,19,19;B0;F0
 TH:#15JA
 JY:@P

P:E
 TS:V15,64,24,24;F7;E7
 TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
 P:E
 P:U
 TS:M2;V0,79,0,24;E7
 TX:
 TS:V1,78,1,23;E6
 TX:
 TS:V13,66,3,8;E0;F0
 TX:
 T:
 : #14In THE READER'S GUIDE TO PERIODIC LITERATURE.
 : #15The meaning of an ABBREVIATION
 : can usually be found ...
 TH:

TS:V13,66,10,15;E0;F0
 TX:
 T: #14a. not at all.
 : b. near the front.
 : c. near the back.
 :
 TH: #7(Please type a, b, or c.)

P:U
 R:Make an answer viewport
 TS:V13,66,18,19;E0;F0
 AS:
 M:A!B!C
 TS:V13,66,18,19;E0;F0
 TN:
 TNH: #15Please answer a, b, or c
 JN:@A

MJ:A
 TY: #14A. Please LOOK AT THE PICTURE
 TYH: AND TRY AGAIN
 W:30
 JY:FRONT

MJ:C
 TY: #14C. Please LOOK AT THE PICTURE
 TYH: AND TRY AGAIN
 W:30
 JY:FRONT

*FRONT
 GSX:

TS:M4;B16
 FX:CC2BE5.PIQ
 FI:0,PICT\$
 V:PIQSH\$
 W:100

TS:M2;F14
 GX:
 J:@-P

MJ:B
 TY: #14B. #15VERY GOOD!!
 TYH: #14THE ABBREVIATIONS ARE NEAR THE FRONT.
 JY:@P

PS:E
 TS:V15,64,24,24;F7;E7
 TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
 PS:E
 TS:V0,79,0,24;E5;F5
 TX:
 T: #15THE READER'S GUIDE TO PERIODICAL LITERATURE
 T: *****
 TH:

TS:V4,22,4,10;F0;B0
 TX:
 T: #14LET'S SUM UP
 :
 : WHAT YOU HAVE
 :
 TH: LEARNED SO FAR.

AS:
 P:E

TS:V1,78,1,23
 X:B\$
 TX:
 T: #15The READER'S GUIDE
 : TO PERIODICAL LITERATURE contains
 :

```

:      1. #14SUBJECT HEADINGS
:      #15(people, places, things)
:      & 2. #14ABBREVIATIONS
:

```

TH:

TS:V15,64,24,24;F7;E7

TH: #0Please PUSH ENTER to continue or ESC to see Menu

*SEE

PS:E

TX: #13You have selected #14SEE and SEE ALSO.

TS:V15,64,24,24;F7;E7

TH: #0Please PUSH ENTER to continue or ESC to see Menu

*SE1

AS:

PS:E

TS:V0,79,0,24;E1;F1

TX:

T: #15THE READER'S GUIDE TO PERIODICAL LITERATURE

: *****

TH: #13Lesson 4 #14SEE and SEE ALSO.

X:AS

TX:

T: #14WHAT

:

:

:

TH: #14IT?

AS:

P:E

TS:V1,78,1,23

X:BS

TX:

T:

: #15TO SEE #14ANOTHER THING IN IT

:

:

:

:

: PRESS ENTER NOW.

TH:

TS:V15,64,24,24;F7;E7

TH: #0Please PUSH ENTER to continue or ESC to see Menu

W:200

R: This done to read in the picture file.

P:E

FX: CC2CE2.PIQ

FI: 0,PICT\$

R: This done to set display.
TS:M5;B16

R: This done to display the image with current parameters:
C: PIQSH\$(3,3) = "R"!!CHR(1)!!CHR(31)
C: PIQSH\$(6,4) = CHR(1)!!CHR(40)!!CHR(1)!!CHR(25)
C: PIQSH\$(16,3) = "X"!!CHR(1)!!CHR(1)
V: PIQSH\$

R: This done to read in the picture file.
AS:
P:E
FX: CC2CE3.PIQ
FI: 0,PICT\$

R: This done to set display.
TS:M5;B16

R: This done to display the image with current parameters:
C: PIQSH\$(3,3) = "F"!!" "!!CHR(31)
C: PIQSH\$(6,4) = CHR(1)!!CHR(40)!!CHR(1)!!CHR(25)
C: PIQSH\$(16,3) = "X"!!CHR(1)!!CHR(1)
V: PIQSH\$

R: This done to read in the picture file.
AS:
P:E
FX: CC2CE4.PIQ
FI: 0,PICT\$

R: This done to set display.
TS:M5;B16

R: This done to display the image with current parameters:
C: PIQSH\$(3,3) = "L"!!CHR(1)!!CHR(31)
C: PIQSH\$(6,4) = CHR(1)!!CHR(40)!!CHR(1)!!CHR(25)
C: PIQSH\$(16,3) = "X"!!CHR(1)!!CHR(1)
V: PIQSH\$

R: This done to read in the picture file.
AS:
P:E
FX: CC2CE5.PIQ
FI: 0,PICT\$

R: This done to set display.
TS:M5;B16

R: This done to display the image with current parameters:
C: PIQSH\$(3,3) = "F"!!" "!!CHR(31)
C: PIQSH\$(6,4) = CHR(1)!!CHR(40)!!CHR(1)!!CHR(25)
C: PIQSH\$(16,3) = "X"!!CHR(1)!!CHR(1)
V: PIQSH\$

AS:
 P:E
 P:U
 TS:M2;V0,79,0,24;E7;F7
 TX:
 TS:V1,78,1,23;E1;F1
 TX:
 TS:V20,59,2,2;E3;F3
 TX:
 TH: #14Let's try using #15SEE & SEE ALSO #14now.
 TS:V18,61,4,5;B3;F3
 TX: #14On which page would you look
 TH: for more #15information about AFRICA?
 TS:V7,27,8,18;B7;F7
 TX:
 T: #0AFRICA
 : #8See also
 : #0Women-Africa
 :
 : #8News notes. il
 : Time 23: 4-6
 : J1 4 '90.
 : Today in Africa.
 TH: Life 42: 27-32.

 TS:V36,56,7,17;B7;F7
 TX:
 T:
 : #0WOMEN
 : Africa
 : #8Where I am.
 : il Ebony 21
 : 12-23 J1 90
 TH:
 TS:V36,37,17,17;B4;F4
 TH: #15A

 TS:V52,72,9,18;B1
 TX:

 TS:V53,73,9,19;B7;F7
 TX:
 T:
 : #0COOKERY
 : A new way.
 : Redbook
 : 44: 125-6
 : J1 4 '90
 TH:
 TS:V53,54,19,19;B4;F4
 TH: #15B

 TS:V27,52,22,22;B7;F7

TH: #4Please answer A or B.

R:Make an answer viewport

TS:V55,75,21,22;E7;F7

TX:

AS:

M:A!B

TS:V55,77,21,22;E7;F7

TX:

TNH: #14Please answer A or B.

JN:@A

MJ:B

TXY: #4BUT the #14SEE ALSO

TYH: #4said #14Women-Africa

JY:@A

MJ:A

TYX: #4A #14GREAT!!!

TYH:

JY:@P

P:E

TS:V15,64,24,24;F7;E7

TH: #0Please PUSH ENTER to continue or ESC to see Menu

R:[A

AS:

P:E

P:U

TS:M2;V0,79,0,24;E1;F1

TX:

TS:V20,59,1,1;E3;F3

TH: #0Let's try using #14SEE & SEE ALSO #0again.

TS:V19,60,3,6;E6;F6

T: #15What new #14SUBJECT HEADING #15 might

: offer more #14information about OIL?

TH:

TS:V20,59,8,19;B0;F0

TX:

TS:V21,58,9,18;B7;F7

TX:

T: #0CINEMA #8See #0Motion pictures

:

: OIL #8See #0Petroleum

:

: PETS

: Food and feeding

:

: #8See #0Pet food

TH:

TS:V20,59,21,22;E3;F3
 T: #0Please look at the #14subject heading OIL
 TH: #0and type the answer.

P:U
 TS:V34,60,5,5;B6;F14
 A:
 MS:%PETROLEUM

TS:V20,59,21,23;E3;F3
 TN: #0You want information #14about OIL
 TN: #0Please look at #14See
 TNH: #0and type the answer.

TS:V33,41,12,12;B11;F3
 TNH:#0Petroleum

TS:V34,60,5,5;E6;F14
 TN:
 TNH:_____
 JN:@-P

TS:V20,59,21,23;B3;F3
 TYX:
 TYH: #14YOU ARE CORRECT!

TS:V33,41,12,12;F3;E3
 TYH:#0Petroleum

TS:V34,60,5,6;B6;F15
 TY:PETROLEUM
 TYH:-----
 JY:@P

P:E
 TS:V15,64,24,24;F7;E7
 TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
 P:E
 P:U
 TS:M2;V0,79,0,24;E7
 TX:
 TS:V1,78,1,23;E6
 TX:
 TS:V13,66,3,8;E0;F0
 TX:
 T:
 : #14In THE READER'S GUIDE TO PERIODIC LITERATURE.
 : #15When you look up a subject and
 : find the words #14SEE & SEE ALSO, #15you
 TH:

AS:

P:E
P:U
TS:V13,66,10,15;E0;F0
TX:
T: #14a. are confused.
: b. have another place to look for information.
:
TH: #7(Please type a, or b.)

R:Make an answer viewport
P:U
TS:V23,56,17,20;F0;E0
TX:
AS:
M: A!B
TN:
TN:
TN: #15Please answer a or b#0X
JN:@A

MJ:A
TY:#7A #14SEE & SEE ALSO #15show you
TY: #14another place
TY: to look for information.
TYH: #7(Please try again.)
J:@A

MJ:B
TYX:#7B
TY: #15GREAT!!!!
TY: #14You know your subject.
JY:@P

P:E
TS:V15,64,24,24;F7;E7
TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
P:E
TS:M2;V0,79,0,24;F5;E5
TX:
T: #15THE READER'S GUIDE TO PERIODICAL LITERATURE
: *****
TH:

TS:V4,22,4,10;F0;B0
TX:
T: #14LET'S SUM UP
:
: WHAT YOU HAVE
:
TH: LEARNED SO FAR.

AS:

P:E
X:B\$
TX:
T: #15The READER'S GUIDE
: TO PERIODICAL LITERATURE contains
:
: 1. #14SUBJECT HEADINGS
: (people, places, things)
: #15& 2. #14ABBREVIATIONS
TH: #15& 3. #14SEE & SEE ALSO.

P:E
TS:V15,64,24,24;F7;E7
TH: #0Please PUSH ENTER to continue or ESC to see Menu
J:ARR1

*ARRANG
PS:E
TX: #13You have selected #14HOW IS IT ARRANGED?
TS:V15,64,24,24;F7;E7
TH: #0Please PUSH ENTER to continue or ESC to see Menu

*ARR1
AS:
PS:E
TS:M2;V0,79,0,24;E1;F1
TX:
T: #15THE READER'S GUIDE TO PERIODICAL LITERATURE
: *****
TH: #13Lesson 5 #14HOW IS IT
ARRANGED?

X:A\$
TX:
T: #15HOW
:
: IS #15IT
:
TH: #14ARRANGED?

AS:
P:E

TS:V1,78,1,23
X:B\$
TX:
T:
: #14TO SEE HOW IT IS ARRANGED
:
: AND HOW THIS CAN HELP YOU
:
: #15PRESS ENTER NOW.
TH:

TS:V15,64,24,24;F7;E7

TH: #0Please PUSH ENTER to continue or ESC to see Menu
W:200

R: This done to read in the picture file.

P:E

FX: CC3E2A.PIQ

FI: 0,PICT\$

R: This done to set display.

TS:M5;B16

R: This done to display the image with current parameters:

C: PIQSH\$(3,3) = "R"!! "!!CHR(32)

C: PIQSH\$(6,4) = CHR(1)!!CHR(40)!!CHR(1)!!CHR(25)

C: PIQSH\$(16,3) = "X"!!CHR(1)!!CHR(1)

V: PIQSH\$

R: This done to read in the picture file.

AS:

P:E

FX: CC3E2B.PIQ

FI: 0,PICT\$

R: This done to set display.

TS:M5;B16

R: This done to display the image with current parameters:

C: PIQSH\$(3,3) = "F"!! "!!CHR(32)

C: PIQSH\$(6,4) = CHR(1)!!CHR(40)!!CHR(1)!!CHR(25)

C: PIQSH\$(16,3) = "X"!!CHR(1)!!CHR(1)

V: PIQSH\$

R: This done to read in the picture file.

AS:

P:E

FX: CC3E2C.PIQ

FI: 0,PICT\$

R: This done to set display.

TS:M5;B16

R: This done to display the image with current parameters:

C: PIQSH\$(3,3) = "F"!! "!!CHR(31)

C: PIQSH\$(6,4) = CHR(1)!!CHR(40)!!CHR(1)!!CHR(25)

C: PIQSH\$(16,3) = "X"!!CHR(1)!!CHR(1)

V: PIQSH\$

R: This done to read in the picture file.

AS:

P:E

FX: CC3E3.PIQ

FI: 0,PICT\$

R: This done to set display.

TS:M5;B16

R: This done to display the image with current parameters:

C: PIQSH\$(3,3) = "F"!! "!!CHR(31)

C: PIQSH\$(6,4) = CHR(1)!!CHR(40)!!CHR(1)!!CHR(25)

C: PIQSH\$(16,3) = "X"!!CHR(1)!!CHR(1)

V: PIQSH\$

AS:

P:E

TS:M2;V0,79,0,24;E7;F7

TX:

TS:V1,78,1,23;E1;F1

TX:

TS:V18,59,2,3;E0;F0

T: #14SUBJECT DIVISIONS #15lead you to exactly

TH: what you need.

TS:V5,43,5,21;E7;F0

T: #41

: #14AFRICA #4<-----

:

: #8xxxxxx xxx xxxxxxxx xxxxxxxx

: xxxxxx xxx xxxxxxxx xxxxxxxx

: xxxxxx xxx xxxxxxxx xxxxxxxx

: xxxxxx xxx xxxxxxxx xxxxxxxx

: #42

: #14Industries #4<-----

:

: #8xxxxxx xxx xxxxxxxx xxxxxxxx

: xxxxxx xxx xxxxxxxx xxxxxxxx

: xxxxxx xxx xxxxxxxx xxxxxxxx

: xxxxxx xxx xxxxxxxx xxxxxxxx

: xxxxxx xxx xxxxxxxx xxxxxxxx

TH: xxxxxx xxx xxxxxxxx xxxxxxxx

TS:V50,70,6,12;B1;F15

T:If you needed

:

:to know about

:

TH:#14AFRICAN Industries,

AS:

P:E

P:U

TS:V50,70,13,22;B1;F15

TX:

T:you would look

:

: 1st under

:

:
: 2nd under
:
TH:

R:Set answer viewports
TS:V61,68,17,17;E2;F2
TH: #14AFRICA

TS:V61,72,20,20;E2;F2
TH: #14Industries

PS:E
TS:V15,64,24,24;F7;E7
TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
PS:E
TS:V18,59,2,3;E2;F2
T: #15Let's go to exactly #15what you need
TH: with #14SUBJECT DIVISIONS

TS:V15,64,24,24;F7;E7
TH: #0Please PUSH ENTER to continue or ESC to see Menu

R:Set and clear answer viewports
TS:V61,68,17,17;B7;F14
TX:

TS:V61,72,20,20;B7;F14
TX:

TS:V62,68,17,17;F14;B7
A:
MS:%AFRICA

TS:V15,34,22,21;E0;F0
TNH: #12PLEASE TRY AGAIN.
JN:@-P

TS:V10,39,22,21;E0;F0
TYH: #12GOOD! NOW TRY THE NEXT ONE.

TS:V61,68,17,17;E2;F2
TH: #14AFRICA
JN:@P

PS:E
TS:V62,72,20,20;B7;F14
A:
MS:%INDUSTRIES

TS:V10,39,22,21;E0;F0
TX:

TNH: #12PLEASE TRY AGAIN.
JN:@-P

TS:V61,72,20,20;E2;F2
TYH: #14INDUSTRIES

TS:V10,39,22,21;E1;F1
TX:
TS:V12,33,22,21;B0;F0
TYH: #12THAT WAS VERY GOOD! #0X
JN:@P

AS:
PS:E
TS:M2;V25,52,1,2;E3;F14
TX: #15Let's try using
TH: #14SUBJECT DIVISIONS #15again

TS:V15,64,24,24;F7;E7
TH: #0Please PUSH ENTER to continue or ESC to see Menu

TS:V5,43,5,21;E7;F0
TX:

T: #14MIDDLE EAST #4<-----

```

:
: #8xxxxxx xxx xxxxxxxx xxxxxxxx
:   xxxxxx xxx xxxxxxxx xxxxxxxx
: xxxxxx xxx xxxxxxxx xxxxxxxx
:   xxxxxx xxx xxxxxxxx xxxxxxxx
:

```

: #14Petroleum #4<-----

```

:
: #8xxxxxx xxx xxxxxxxx xxxxxxxx
:   xxxxxx xxx xxxxxxxx xxxxxxxx
: xxxxxx xxx xxxxxxxx xxxxxxxx
:   xxxxxx xxx xxxxxxxx xxxxxxxx
: xxxxxx xxx xxxxxxxx xxxxxxxx
:

```

TH: xxxxxx xxx xxxxxxxx xxxxxxxx

TS:V50,72,6,12;B1;F15

T: If you needed

```

:
: to know about
:

```

TH: #14MIDDLE EAST Petroleum

AS:
P:E
P:U
TS:V50,76,13,22;B1;F15

T:
: you would look
:
: first under

:
:
: then under
:
TH:

R:Set and clear answer viewports
TS:V62,74,17,17;B7;F14
TX:

TS:V61,71,20,20;B7;F14
TX:

PS:E
TS:V63,74,17,17;F14;B7
A:
MS:%MIDDLE EAST

TS:V15,34,22,21;E0;F0
TNH: #12PLEASE TRY AGAIN.
JN:@-P

TS:V62,74,17,17;E3;F3
TYH: #14MIDDLE EAST

TS:V10,39,22,21;E0;F0
TYH: #12GOOD! NOW TRY THE NEXT ONE.
JY:@P

PS:E
TS:V62,71,20,20;B7;F14
A:
MS:%PETROLEUM

TS:V10,39,22,21;E0;F0
TX:
TNH: #12PLEASE TRY AGAIN.
JN:@-P

TS:V61,71,20,20;E3;F3
TYH: #14PETROLEUM

TS:V12,33,22,21;B0;F0
TYH: #12YOU HAVE THE IDEA! #0X

JY:@P

P:E
TS:V15,64,24,24;F7;E7
TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
P:E
P:U

TS:M2;V0,79,0,24;E7

TX:

TS:V1,78,1,23;E6

TX:

TS:V13,66,4,12;E0;F0

TX:

T:
 : #15When you look up a #14SUBJECT #15and
 : find a #14SUBJECT DIVISION#15, you
 :
 : #14A. #15Have a more exact place
 : to look for information.
 : #14B. #15Should ignore it.

TH:

TS:V12,67,15,21;E0;F0

TX:

TS:V13,66,16,20;E0;F0

TH: #15Please choose #14A #15or #14B

TS:V49,50,16,16;E4;F15

TX:

AS:

TS:V13,66,18,20;E0;F0

TX:

M:A!B

TN: #15Please PRESS #14A #15or #14B#0x

TN:

JN:@A

MJ:A

TX:

TY: #15VERY GOOD!!

TY: #14The SUBJECT DIVISION

TYH: #15gives you an EXACT PLACE TO LOOK

TS:V49,50,16,16;E4;F4

TYH: #15A

JY:@P

MJ:B

TY: #14The SUBJECT DIVISION #15would

TY: #15give you an EXACT PLACE TO LOOK

TYH: #12(Please try again.)

TS:V49,50,16,16;E4;F4

TYH: #15B

JY:@A

PS:E

TS:V15,64,24,24;F7;E7

TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:

PS:E

TS:M2;V0,79,0,24;E5;F5

TX:
T: #15THE READER'S GUIDE TO PERIODICAL LITERATURE
: *****
TH:

TS:V4,22,4,10;F0;B0

TX:
T: #14LET'S SUM UP
:
: WHAT YOU HAVE
:
TH: LEARNED SO FAR.

TS:V1,78,1,23

X:B\$

TX:
T: #15The READER'S GUIDE
: TO PERIODICAL LITERATURE is arranged
:
: #151. #14ALPHABETICALLY
: #15& 2. By #14SUBJECTS
: #15& 3. And by #14SUBJECT DIVISIONS

TH:
TS:V15,64,24,24;F7;E7
TH: #0Please PUSH ENTER to continue or ESC to see Menu
J:US1

*USED

PS:E

TX: #13You have selected #14HOW IS IT USED?

TS:V15,64,24,24;F7;E7

TH: #0Please PUSH ENTER to continue or ESC to see Menu

*US1

AS:

PS:E

TS:M2;V0,79,0,24;E1;F1

TX:
T: #15THE READER'S GUIDE TO PERIODICAL LITERATURE
: *****
TH: #13Lesson 6 #14HOW IS IT USED?

X:A\$

TX:

T: #15HOW

:
: IS #15IT
:

TH: #14USED?

AS:

P:E

TS:V1,78,1,23

```

X:B$
TX:
T:  #14TO SEE HOW IT IS USED
:
:      AND HOW THIS CAN HELP YOU
:
:      #15 PRESS ENTER NOW.
TH:
TS:V15,64,24,24;F7;E7
TH: #0Please PUSH ENTER to continue or ESC to see Menu
W:200

```

R: This done to read in the picture file.

```

P:E
FX: CC4E2.PIQ
FI: 0,PICT$

```

R: This done to set display.

```
TS:M5;B16
```

R: This done to display the image with current parameters:

```

C: PIQSH$(3,3) = "E"!!" "!!CHR(31)
C: PIQSH$(6,4) = CHR(1)!!CHR(40)!!CHR(1)!!CHR(25)
C: PIQSH$(16,3) = "X"!!CHR(1)!!CHR(1)
V: PIQSH$

```

R: This done to read in the picture file.

```

AS:
P:E
FX: CC4E2B.PIQ
FI: 0,PICT$

```

R: This done to set display.

```
TS:M5;B16
```

R: This done to display the image with current parameters:

```

C: PIQSH$(3,3) = "F"!!" "!!CHR(31)
C: PIQSH$(6,4) = CHR(1)!!CHR(40)!!CHR(1)!!CHR(25)
C: PIQSH$(16,3) = "X"!!CHR(1)!!CHR(1)
V: PIQSH$

```

R: This done to read in the picture file.

```

AS:
P:E
FX: CC4E3.PIQ
FI: 0,PICT$

```

R: This done to set display.

```
TS:M5;B16
```

R: This done to display the image with current parameters:

```

C: PIQSH$(3,3) = "F"!!" "!!CHR(31)
C: PIQSH$(6,4) = CHR(1)!!CHR(40)!!CHR(1)!!CHR(25)
C: PIQSH$(16,3) = "X"!!CHR(1)!!CHR(1)

```

V: PIQSH\$

R: This done to read in the picture file.

AS:

P:E

FX: CC4E4.PIQ

FI: 0,PICT\$

R: This done to set display.

TS:M5;B16

R: This done to display the image with current parameters:

C: PIQSH\$(3,3) = "I!!" "!!CHR(31)

C: PIQSH\$(6,4) = CHR(1)!!CHR(40)!!CHR(1)!!CHR(25)

C: PIQSH\$(16,3) = "X"!!CHR(1)!!CHR(1)

V: PIQSH\$

R: This done to read in the picture file.

AS:

P:E

FX: CC4E5.PIQ

FI: 0,PICT\$

R: This done to set display.

TS:M5;B16

R: This done to display the image with current parameters:

C: PIQSH\$(3,3) = "F!!" "!!CHR(31)

C: PIQSH\$(6,4) = CHR(1)!!CHR(40)!!CHR(1)!!CHR(25)

C: PIQSH\$(16,3) = "X"!!CHR(1)!!CHR(1)

V: PIQSH\$

AS:

P:E

TS:M2;V0,79,0,24;E1;F1

TX:

TS:V18,60,2,3;E6;F6

TX: #15LET'S TRY TO USE THE #14PARTS OF THE ENTRY

TH: #15TO FILL OUT A #14MAGAZINE REQUEST.

TS:V3,35,5,13;E7;F7

TX:

T: #1SPACE FLIGHT

:

: The man of today.

:

: LIFE 21:35-6 D '90

:

:

TH:

TS:V11,18,9,9;B6;F15

TH: Article

TS:V8,16,11,11;B6;F15

TH: Magazine
 TS:V19,24,11,11;B6;F15
 TH: Pages
 TS:V26,33,11,11;B6;F15
 TH: Date of
 TS:V26,34,12,12;B6;F15
 TH: Magazine

P:E
 P:U
 TS:V5,74,15,22;B7;F0
 TX:
 T: ARTICLE _____
 :
 T: MAGAZINE _____ PAGE _____
 :
 : DATE OF MAGAZINE _____
 : #8(Please fill in the blank spaces)
 TH:

TS:V15,74,16,16;B7;F1
 A:
 MS:THE MAN OF TODAY.

TS:V38,60,7,11;E1;F1
 TN: #15 Please look at
 TN:<--this #14ENTRY #15from
 TNH: the #14READER'S GUIDE

TS:V15,74,16,16;B7;F1
 JN:@-P

TYH:THE MAN OF TODAY#0 _____
 TS:V38,60,7,9;E1;F1
 TY: #15GOOD!
 TY: NOW FILL IN
 TYH: THE NEXT SPACE.
 JY:@P

PS:E
 TS:V16,74,18,18;B7;F1
 A:
 MS:LIFE

TS:V38,60,7,11;E1;F1
 TN: #15 Please look at
 TN:<--this #14ENTRY #15from
 TNH: the #14READER'S GUIDE

TS:V16,74,18,18;B7;F1
 TNH:#0 _____ PAGE _____
 JN:@-P

TYH:LIFE#0 _____ PAGE _____

TS:V38,60,7,9;E1;F1
 TY: #15GOOD!
 TY: NOW FILL IN
 TYH: THE NEXT SPACE.
 JY:@P

PS:E
 TS:V60,74,18,18;B7;F1
 A:
 MS:35-6

TS:V38,60,7,11;E1;F1
 TN: #15 Please look at
 TN:<-- this #14ENTRY #15from
 TNH: the #14READER'S GUIDE

TS:V60,74,18,18;B7;F1
 TNH:#0
 JN:@-P

TYH:35-6#0
 TS:V38,60,7,9;E1;F1
 TY: #15GOOD!
 TY: NOW FILL IN
 TYH: THE NEXT SPACE.
 JY:@P

PS:E
 TS:V24,74,20,20;B7;F1
 A:
 M:D&90

TS:V38,60,7,11;E1;F1
 TN: #15 Please look at
 TN:<-- this #14ENTRY #15from
 TNH: the #14READER'S GUIDE

TS:V24,74,20,20;B7;F1
 TNH:#0
 JN:@-P

TYH:DECEMBER 1990#0
 TS:V38,65,7,9;E9;F1
 TY: #12WONDERFUL!
 TY: WONDERFUL!
 TYH: WONDERFUL!
 W:15

TS:V38,65,7,9;E1;F1
 TY: #14YOU HAVE LEARNED
 TY: THE MOST IMPORTANT IDEA
 TYH: IN THIS LESSON.
 JY:@P

PS:E
 TS:V15,64,24,24;F7;E7

TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:

P:E

TS:M2;V0,79,0,24;E1;F1

TX:

TS:V20,58,2,3;E2;F2

TX: #15LET'S TRY AGAIN WITHOUT HELP

TH: #14YOU CAN DO IT !

TS:V3,35,5,13;E7;F7

TX:

T: #1MIDDLE EAST

:

: The new leaders. il

:

: TIME 35:52-9 Ap 7 '91

:

:

TH:

P:E

P:U

TS:V5,74,15,22;B7;F0

TX:

T: ARTICLE_____

:

T: MAGAZINE_____

PAGE_____

:

: DATE OF MAGAZINE_____

:

#8(Please fill in the blank spaces)

TH:S:V15,74,16,16;B7;F1

TS:V15,74,16,16;B7;F1

A:

MS:THE NEW LEADERS.

TS:V38,60,8,12;E1;F1

TN: #15 Please look at

TN:<--this #14ENTRY #15from

TNH: the #14READER'S GUIDE

TS:V11,18,9,9;B2;F15

TH: Article

TS:V15,74,16,16;B7;F1

JN:@-P

TYH: THE NEW LEADERS#0_____

TS:V38,60,7,9;E1;F1

TY: #15GOOD!

TY: NOW FILL IN

TYH: THE NEXT SPACE.

JY:@P

PS:E

TS:V16,74,18,18;B7;F1

A:

MS:TIME

TS:V38,60,10,14;E1;F1

TN: #15 Please look at

TN:<-- this #14ENTRY #15from

TNH: the #14READER'S GUIDE

TS:V8,16,11,11;B2;F15

TH: Magazine

TS:V16,74,18,18;B7;F1

TNH:#0

PAGE

JN:@-P

TYH:TIME#0

PAGE

TS:V38,60,7,9;E1;F1

TY: #15GOOD!

TY: NOW FILL IN

TYH: THE NEXT SPACE.

JY:@P

PS:E

TS:V60,74,18,18;B7;F1

A:

MS:52-9

TS:V38,60,10,14;E1;F1

TN: #15 Please look at

TN:<-- this #14ENTRY #15from

TNH: the #14READER'S GUIDE

TS:V18,23,11,11;B2;F15

TH: Pages

TS:V60,74,18,18;B7;F1

TNH:#0

JN:@-P

TYH:52-9#0

TS:V38,60,7,9;E1;F1

TY: #15GOOD!

TY: NOW FILL IN

TYH: THE NEXT SPACE.

JY:@P

PS:ETS:V24,74,20,20;B7;F1

A:

MS:AP&7&91

TS:V38,60,10,14;E1;F1
 TN: #15 Please look at
 TN:<-- this #14ENTRY #15from
 TNH: the #14READER'S GUIDE

TS:V25,32,11,11;B2;F15
 TH: Date of
 TS:V25,33,12;B2;F15
 TH: Magazine

TS:V24,74,20,20;B7;F1
 TNH:#0
 JN:@P

TYH:APRIL 7 1991#0
 TS:V38,65,7,9;E9;F1
 TY: #10WONDERFUL!
 TY: WONDERFUL!WONDERFUL!
 W:15

TS:V38,65,7,9;E1;F1
 TY: #14YOU KNOW HOW TO
 TY: FILL IN A
 TYH: MAGAZINE REQUEST.
 JY:@P

PS:E
 TS:V15,64,24,24;F7;E7
 TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
 TS:M2;V0,79,0,24;E6
 TX:
 TS:V2.77,1,23;E7
 TX:TS:V3,76,2,22;E6;F6
 TX:
 P:E
 P:U
 TS:V15,71,3,21
 TX:
 T:
 : #14THE FOUR (4) ITEMS #15YOU NEED TO
 : #14FILL IN A MAGAZINE REQUEST #15ARE
 :
 TS:V27,47,9,9;E7;F7
 TH: #14ARTICLE
 TS:V27,47,11,11;E7;F7
 TH: #14MAGAZINE
 TS:V27,47,13,13;E7;F7
 TH: #14PAGE
 TS:V27,47,15,15;E7;F7
 TH: #14MAGAZINE
 TS:V52,75,10,10;B6;F6
 TX:#15Please #14FILL IN ANSWER

TS:V36,47,9,9;B7;F15

A:

M:NAME

TS:V27,47,9,9;E7;F7

TNH: #5ARTICLE NAME

W:10

TS:V27,47,9,9;E7;F7

TH: #5ARTICLE NAME

TS:V52,75,8,22;E6;F6

T: #14CORRECT!

T:THE #15ARTICLE NAME

TH: #14IS NEEDED.

P:E

P:U

TS:V55,71,19,22;E6

TX:

TS:V37,47,11,11;B7;F15

A:

M:NAME

TS:V27,47,11,11;E7;F7

TNH: #5MAGAZINE NAME

W:10

TS:V27,47,11.11;E7;F7

TH: #5MAGAZINE NAME

TS:V52,75,10,22;E6;F6

T: #14&

T:#14THE #15MAGAZINE NAME

TH: #14ARE NEEDED.

P:E

P:U

TS:V55,71,19,22;E6

TX:

TS:V33,47,13,13;B7;F15

A:

MS:NUMBER

TS:V27,47,13,13;E7;F7

TNH: #5PAGE NUMBERS

W:10

TS:V27,47,13,13;E7;F7

TH: #5PAGE NUMBERS

TS:V52,75,12,22;E6;F6

T: #14&

T:#14THE #15PAGE NUMBERS

TH: #14ARE NEEDED.

P:E

P:U
 TS:V55,71,19,22;E6
 TX:
 TS:V37,47,15,15;B7;F15
 A:
 M:DATE

TS:V27,47,15,15;E7;F7
 TH: #5MAGAZINE DATE
 TS:V52,75,14,22;E6;F6
 T: #14&
 T:#14THE #15MAGAZINE DATE
 TH: #14ARE NEEDED.

PS:E
 TS:V15,64,24,24;F7;E7
 TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
 PS:E
 TS:M2;V0,79,0,24;E5;F5
 TX:
 T: #15THE READER'S GUIDE TO PERIODICAL LITERATURE
 : *****
 TH:

TS:V4,22,4,10;F0;B0
 TX:
 T: #15LET'S SUM UP
 :
 : WHAT YOU HAVE
 :
 TH: LEARNED SO FAR.

TS:V1,78,1,23
 TS:V32,75,12,21;F0;B0
 TX: #15THE READER'S GUIDE TO
 T: PERIODICAL LITERATURE
 :
 : A. #14is a GUIDE to INFORMATION
 : found in MAGAZINES.
 : #15B. #14shows you
 : #15(1) the #14ARTICLE NAME
 : #15(2) the #14MAGAZINE NAME
 : #15(3) the #14PAGE NUMBERS
 TH: #15(4) the #14MAGAZINE DATE
 TS:V15,64,24,24;F7;E7

PS:E
 TS:V15,64,24,24;F7;E7
 TH: #0Please PUSH ENTER to continue or ESC to see Menu
 L:CC2GUIDE

*CHALLE

PS:E

TX: #13You have selected #14THE CHALLENGE

TS:V15,64,24,24;F7;E7

TH: #0Please PUSH ENTER to continue or ESC to see Menu

L:CC2GUIDE

```

R:Program CC2GUIDE
R:The beginning of Module 2 and Lesson 7
*CH1
AS:
R:Setup of viewports of varying colors and sizes
TS:M2;VO,79,0,24;E5;F5
TX:
TS:V3,76,1,23;E1;F1
TX:
TS:V6,73,2,22;E6;F6
TS:V17,68,2,22;E6;F6
TX: #14THE READER'S GUIDE TO PERIODICAL LITERATURE
TS:V9,70,3,21;E5;F5
TX:
TS:V12,67,4,20;E1;F1
TX:
TS:V15,64,5,19;E6;F6
TX:
TS:V18,61,6,18;E5;F5
TX:
TS:V21,58,7,17;E1;F1
TX:
TS:V24,55,8,16;E6;F6
TX:
R:Backgroud color allows blinking text.
TS:V27,53,9,15;E13;F5
TX:
T:
:           #14THE
:
:           CHALLENGE
:
TH:
W:30
TS:V27,53,9,15;E5;F5
TX:
T:
:           #14THE
:
:           CHALLENGE
:
TH:

P:E
TS:V15,64,24,24;F6;E6
TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
TS:V24,55,8,16;E6;F6
TX:
T:           #15Can YOU fill out a
:
:           #14REQUEST FORM

```

:
:
:
: #15to ask for
:
: #14INFORMATION in MAGAZINES?
TH:

P:E
TS:V15,64,24,24;F6;E6
TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
TS:V21,58,7,17;E1;F1
TX:
T:
:
: #15YOU CAN with the
:
:
: #14METHODS
:
:
: #15you have used
:
:
: #14IN THIS TUTORIAL.
:
TH:

P:E
TS:V15,64,24,24;F6;E6
TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
TS:V8,71,3,21;E6;F6
TS:V28,51,3,21;E6;F6
TX:#15(The CHALLENGE Review)
TS:V32,44,5,5;E1;F1
TH: #15WHAT IS IT?

P:E
TS:V15,64,24,24;F6;E6
TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
TS:V23,55,5,6;E1;F1
TH: #151. It is a #14GUIDE #15to #14INFORMATION
TH: #15found in #14MAGAZINES.

P:E
TS:V15,64,24,24;F6;E6
TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
TS:V8,18,19,20;E1;F1
TX: #15How is it
TH: #14ARRANGED?

P:E
 TS:V15,64,24,24;F6;E6
 TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
 TS:V13,24,17,17;E6;F6
 TH: #0ARRANGED
 TS:V8,29,18,21;E1;F1
 TX: #151. ALPHBETICALLY
 T: 2. By #14SUBJECTS
 : #153. And by #14SUBJECT
 TH: DIVISIONS

P:E
 TS:V15,64,24,24;F6;E6
 TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
 TS:V61,71,19,20;E1;F1
 TX: #15What is
 TH: #14IN IT?

P:E
 TS:V15,64,24,24;F6;E6
 TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
 TS:V53,65,17,17;E6;F6
 TH: #0CONTAINS
 TS:V46,71,18,21;E1;F1
 TX: #151. #14SUBJECT HEADINGS
 T: #152. #14ABBREVIATIONS
 : #153. #14SEE & SEE ALSO
 TH: #15(more SUBJECT HEADINGS)

P:E
 TS:V15,64,24,24;F6;E6
 TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
 TS:V33,45,8,9;E1;F1
 TX: #15How is it
 TH: #14USED?

P:E
 TS:V15,64,24,24;F6;E6
 TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
 TS:V23,55,7,12;E1;F1
 TX:
 : #152. It is used to find
 : (1) the #14ARTICLE NAME

```

:      #15(2) the #14MAGAZINE NAME
:      #15(3) the #14PAGE NUMBERS
TH:    #15(4) the #14ARTICLE DATE

```

P:E

TS:V15,64,24,24;F6;E6

TH: #0Please PUSH ENTER to continue or ESC to see Menu

W:200

R: Next five lines done ONCE per program that uses PIQSHOW:

DX: PIQSH\$(1700)

FX: PIQSHOW.BIN

FI: 0,PIQSH\$

D: PICT\$(16200)

C: PIQSH\$(10,5) = OFF(PICT\$)

R: This done to read in the picture file.

FX: CC5P6.PIQ

FI: 0,PICT\$

R: This done to set display.

TS:M5;B16

R: This done to display the image with current parameters:

C: PIQSH\$(3,3) = "R"!! "!!CHR(31)

C: PIQSH\$(6,4) = CHR(1)!!CHR(40)!!CHR(1)!!CHR(25)

C: PIQSH\$(16,3) = "X"!!CHR(1)!!CHR(1)

V: PIQSH\$

AS:

TS:M2;VO,79,0,24;E5;F5

TX:

TS:V1,78,1,23;E1;F1

TX:

TS:V2,77,2,22;E6;F6

TX:

TS:V13,66,4,9;E1;F1

TX:

TS:V20,60,4,9;E1;F1

TX:

T: #15Let's try filling out a REQUEST

: for MAGAZINES with INFORMATION about

: #14WOMEN in AFRICA

TH:

TS:V18,61,10,15;E7;F7

TX:

TS:V20,60,10,14

TX:

T: #15You would begin by

: looking up which two (2)

: #14SUBJECT HEADINGS?

TH: #8(Please fill in the headings.)

TS:V35,46,17,21;E1;F1

TS:V36,44,17,20;B1

TX:

T:#15(1) _____

TH:(2) _____

P:E

P:U

TS:V39,44,18,18;F14;B6

A:

MS:WOMEN

TS:V54,76,17,19;E7;F7

TN: #15Please look at the

TN: #14first SUBJECT HEADING

TNH: #15and TRY AGAIN.

TS:V32,36,7,7;B15;F14

TNH:WOMEN

JN:@-P

TS:V54,76,17,19;E7;F7

TY: #15GOOD! Now please

TY: fill in the next

TYH: #14SUBJECT HEADING.

TS:V39,44,18,18;E7;F7

TYH:#14WOMEN

TS:V32,36,7,7;B7;F14

TYH:WOMEN

JY:@P

P:E

P:U

TS:V39,45,20,20;F14;B6

A:

MS:AFRICA

TS:V54,76,17,19;E7;F7

TN: #15Please look at the

TN: #14first SUBJECT HEADING

TNH: #15and TRY AGAIN.

TS:V41,46,7,7;B15;F14

TNH:AFRICA

JN:@-P

TS:V54,76,17,19;E7;F7

TY: #15GOOD!

TY: You now have both

TYH: #14SUBJECT HEADINGS.

TS:V39,45,20,20;E7;F7

TYH:#14AFRICA

TS:V41,46,7,7;B7;F14
 TYH:AFRICA
 JY:@P

P:E
 TS:V15,64,24,24;F6;E6
 TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
 TS:VO,79,0,24;E5;F5
 TX:
 TS:V1,78,1,23;E1;F1
 TX:
 TS:V2,77,2,22;E6;F6
 TX:
 TS:V20,59,4,7;E1;F1
 TX:
 T: #15Let's look at the pages with the
 TH: #14two SUBJECT HEADINGS.

TS:V34,47,9,12;E7;F7
 TX:
 T: #0WOMEN
 : #8xxxx xx
 TH: xxxxxx#6
 TS:V34,40,13,17;E7;F7
 TX:
 T: #8xxx
 : xxx
 : xxx
 TH: xxx
 TS:V42,55,13,21;E7;F7
 TX:
 T: #0AFRICA
 : #8xxx xxx
 : xxxxxxxx
 : xxxxxxxx
 :
 : xxx xxxxxx
 : xxxxxx x
 TH: xxxxx

TS:V24,33,10,10;E1;F1
 TH:#14----->
 TS:V32,41,14,14;E1;F1
 TH:#14----->

P:E
 TS:V15,64,24,24;F6;E6
 TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
 P:E
 TS:VO,79,0,24;E5;F5

TX:
 TS:V1,78,1,23;E1;F1
 TX:
 TS:V2,77,2,22;E6;F6
 TS:V24,67,2,22;E6;F6
 TX:#14HERE ARE THE PAGES YOU SELECTED.
 TS:V4,39,4,14;E7;F7
 TX:

T: #0AFRICA
 :
 : See also
 : #8Americans--Africa
 : #0Women--Africa
 : #8Zambezi River
 : Africa today. Newsweek
 : 45:8-13 Mr 4 '90
 : On Africa. Life 34:
 : 23-30 0 '90

TH:

TS:V44,77,4,14;E7;F7

TX:
 T: #0WOMEN
 : #8The end of an era. Time
 : 78:90-7 S 23 '90
 :
 : #0Africa
 : The new people. Life
 : 23:51-4 Ja '91
 :
 :
 :

TH:

TS:V21,58,16,21;E1;F1

TX:
 T: #15Which article will give you
 : #14information about WOMEN in AFRICA?
 :
 : #15Please answer #14a, b, c, #15or #14d.

TH:

TS:V4,5,10,10;E6;F6

TH:#14A

TS:V4,5,12,12;E6;F6

TH:#14B

TS:V44,45,6,6;E6;F6

TH:#14C

TS:V44,45,10,10;E6;F6

TH:#14D

TS:V53,54,20,20;E6;F6

P:U

R:Make an answer viewport

TS:V53,54,20,20;B6;F14

AS:

M:A!B!C!D

TS:V60,77,16,22;E6;F6
 TN:#15Please answer
 TN:A, B, C, or D
 JN:@-P

MJ:D
 TY:#15GREAT!!
 TY:That was the
 TY:ONLY article
 TY:exactly about
 TYH:#14WOMEN IN AFRICA
 JY:@P

MJ:A
 TY:#15PLEASE TRY AGAIN.
 TY:
 TY:The article is
 TY: about #10AFRICA,
 TY:#15but it MAY NOT
 TY: be about
 TYH:#14WOMEN IN AFRICA
 JY:@-P

MJ:B
 TY:#15PLEASE TRY AGAIN.
 TY:
 TY:The article is
 TY: about #11AFRICA,
 TY:#15but it MAY NOT
 TY: be about
 TYH:#14WOMEN IN AFRICA
 JY:@-P

MJ:C
 TY:#15PLEASE TRY AGAIN.
 TY:
 TY:The article is
 TY: about #13WOMEN,
 TY:#15but it MAY NOT
 TY: be about
 TYH:#14WOMEN IN AFRICA
 JY:@-P

P:E
 TS:V15,64,24,24;F6;E6
 TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
 P:E
 TS:VO,79,0,24;E5;F5
 TX:
 TS:V1,78,1,23;E1;F1

TX:
TS:V2,77,2,22;E6;F6

TS:V3,36,3,11;F8;E8
TS:V4,35,4,10;F6;E6

TX:

T: #0AFRICA

:
:
: #0See also
: Americans--Africa
:
: #7Women--Africa
TH: #0Zambezi River

TS:V4,37,11,21;F7;E7
TS:V5,36,12,20;F6;E6

TX:

T: #7WOMEN
: #0The end of an era. Time
: 8:90-7 S 23 '90
:
:
: #7Africa
: #15The new people. Life -----
: 23:51-4 Ja '91
TH:

TS:V50,62,16,16;E6;F6
TH:#15THE ARTICLE
TS:V50,62,21,21;E6;F6
TH:#15YOU SELECTED
TS:V35,49,18,18;E6;F6
TH:#15----->

TS:V44,67,17,20;E7;F7
TX:
: #14The new people. Life
: 23:51-4 Ja '91
TH:

P:E
TS:V15,64,24,24;F7;E7
TH: #0Please PUSH ENTER to continue or ESC to see Menu

AS:
P:E
TS:V0,79,0,24;E0;F0
TX:
TS:V9,70,3,3;E7;F7
TH: #0LET'S SEE IF YOU CAN WRITE A REQUEST FOR THIS ARTICLE NOW.
TS:V30,43,6,6;E6;F6
TH: #15THE ARTICLE
TS:V30,43,11,11;E6;F6
TH: #15YOU SELECTED
TS:V15,26,8,8;E0;F0
TH:#15----->

TS:V25,48,7,10;E7;F7

TX:

: #14The new people. Life

: 23:51-4 Ja '91

TH:

P:E

P:U

TS:V4,75,14,21;E7;F7

T:

#0Request Form

:

:

ARTICLE _____

:

: MAGAZINE _____

PAGE _____

:

TH: DATE OF MAGAZINE _____

TS:V18,61,22,22;E6;F6

TH: #15Please fill in the necessary information.

TS:V14,28,16,16;B7;F14

A:

MS:THE NEW PEOPLE

TS:V11,29,8,8;B0;F0

TH:#15ARTICLE#2----->

TS:V25,51,13,13;B0;F0

TNH: #3Please TRY AGAIN.

JN:@-P

TYH: #3* #2VERY GOOD! #3*

TS:V14,28,16,16;B7;F14

TYH:#14The new people.

JY:@P

PS:E

TS:V15,19,18,18;B7;F14

A:

MS:LIFE

TS:V48,68,8,8;B0;F0

TH:#2<-----#15MAGAZINE

TS:V15,19,18,18;B7;F7

TNH:#0

TS:V25,51,13,13;B0;F0

TNH: #3Please TRY AGAIN.

JN:@-P

TYH: #3* * #2VERY GOOD! #3* *

TS:V15,19,18,18;B7;F14

TYH:#14Life#0_

JY:@P

PS:E

TS:V56,61,18,18;B7;F14

A:

M:51-4!51-54

TS:V19,32,9,9;B0;F0

TH:#15PAGE#2----->

TS:V56,61,18,18;B7;F7

TNH:#0

TS:V25,51,13,13;B0;F0

TNH: #3Please TRY AGAIN.

JN:@-P

TYH: #3* * * #2VERY GOOD! #3* * *

TS:V56,61,18,18;B7;F14

TYH:#1451-4#0__

JY:@P

PS:E

TS:V23,35,20,20;B7;F14

A:

M:JA&91

TS:V43,63,9,9;B0;F0

TH:#2-----#15DATE

TS:V23,35,20,20;B7;F7

TNH:#0

TS:V25,51,13,13;B0;F0

TNH: #3Please TRY AGAIN.

JN:@-P

TYH:#3***** #2VERY GOOD! #3*****

TS:V23,35,20,20;B7;F14

TYH:#14January 1991#0_

JY:@P

P:E

TS:V15,64,24,24;F7;E7

TH: #8Please PUSH ENTER to continue or ESC to see Menu

AS:

TS:V0,79,0,24;E5;F5

TX:

TS:V3,76,1,23;E1;F1

TX:

TS:V6,73,2,22;E6;F6

TS:V17,68,2,22;E6;F6

TX: #14THE READER'S GUIDE TO PERIODICAL LITERATURE

TS:V9,70,3,21;E5;F5

TX:

: See also
TH: Intelligence service

TS:V42,74,5,8;E3;F3
T: #0EXTRASENSORY PERCEPTION
: From parent to child?
: Time 102:15-25 Ap 4 '91

TH:
TS:V44,76,10,13;E3;F3
T: #0INTELLIGENCE SERVICE
: The inside story. il
: Newsweek 24:34-8
TH: D 8 '90

P:E

P:U

TS:V4,75,16,23;E7;F7

T: #0Request Form

:
:

ARTICLE _____

:
: MAGAZINE _____ PAGE _____
:

TH: DATE OF MAGAZINE _____

TS:V14,34,18,18;B7;F14

A:

MS:FROM PARENT TO CHILD

TS:V37,43,6,6;E0;F0

TH:#14ARTICLE

TS:V45,66,6,6;B3;F14

TH:From parent to child?

TS:V27,59,15,15;E0;F0

TNH: #3Please TRY AGAIN.

JN:@-P

TYH: #13* GOOD *

TS:V14,34,18,18;E7;F14

TYH:#14From parent to child?

JY:@P

PS:E

TS:V15,19,20,20;B7;F14

A:

MS:TIME

TS:V37,44,7,7;E0;F0

TH:#14MAGAZINE

TS:V46,50,7,7;B3;F14

TH:Time

TS:V15,19,20,20;B7;F0
 TNH:#0
 TS:V27,59,15,15;E0;F0
 TNH: #3Please TRY AGAIN.
 JN:@-P

TYH: #13* VERY GOOD *
 TS:V15,19,20,20;E7;F14
 TYH:#14Time#0_
 JY:@P

PS:E
 TS:V56,61,20,20;B7;F14
 A:
 M:15-25

TS:V55,59,8,8;E0;F0
 TH:#14PAGES
 TS:V55,60,7,7;E3;F14
 TH:15-25

TS:V56,61,20,20;B7;F7
 TNH:#0
 TS:V27,59,15,15;E0;F0
 TNH: #3Please TRY AGAIN.
 JN:@-P

TYH: #13* QUITE GOOD *
 TS:V56,61,20,20;B7;F14
 TYH:#1415-25#0_
 JY:@P

PS:E
 TS:V25,38,22,22;B7;F14
 A:
 M:AP&4&91

TS:V63,66,8,8;E0;F0
 TH:#14DATE
 TS:V61,69,7,7;E3;F14
 TH:Ap 4 '91

TS:V25,38,22,22;B7;F7
 TNH:#0
 TS:V27,59,15,15;E0;F0
 TNH: #3Please TRY AGAIN.
 JN:@-P

TYH: #13* EXCELLENT *
 TS:V25,38,22,22;B7;F7
 TYH:#14April 4, 1991#0_
 JY:@P

P:E

TS:V15,64,24,24;F0;E0

TH: #7Please PUSH ENTER to continue or ESC to see Menu

AS:

TS:M2;VO,79,0,24;E5;F5

TX:

TS:V3,76,1,23;E1;F1

TS:V26,56,1,23

TX:#14***** YOU ARE NOW A *****

TS:V6,73,2,22;E6;F6

TS:V28,63,2,2

TH:#14READER'S GUIDE TO PERIODICAL

TS:V7,8,9,16;E6;F6

T:#14R

:E

:A

:D

:E

:R'

TH:S

TS:V72,73,8,17;E6;F6

T:#14L

:I

:T

:E

:R

:A

:T

:U

:E

TH:

TS:V32,62,22,22;E6;F6

TH:#14GUIDE TO MAGAZINES

TS:V9,70,3,21;E5;F5

TX:

TS:V12,67,4,20;E1;F1

TX:

TS:V15,64,5,19;E6;F6

TX:

TS:V18,61,6,18;E5;F5

TX:

TS:V21,58,7,17;E1;F1

TX:

TS:V24,55,8,16;E6;F6

TX:

TS:V27,53,9,15;E5;F5

T: #15*****

: *

*

: *

*

: *

*

: *

*

: *

*

TH: *****

TS:V30,50,10,14;E1;F1
 TX:
 TS:V31,49,11,13;E6;F6
 TX:
 TS:V34,48,12,12;E13;F5
 TH:#14QUALIFIED USER#5
 W:10
 TS:V34,48,12,12;E5;F5
 TH:#14QUALIFIED USER#5

TS:V34,48,12,12;E13;F5
 TH:#14QUALIFIED USER#5
 W:10
 TS:V34,48,12,12;E5;F5
 TH:#14QUALIFIED USER

PS:E
 TS:V22,59,24,24;F7;E7
 TH: #0Please PUSH ENTER or ESC to see Menu
 W:200

R:Link to first module.
 L:CCGUIDE,MENU

R:Escape sequence
 *SYSX
 E:MENU2

R:Label that allows escape sequence
 R:to jump to menu in first module.
 *MENU2
 L:CCGUIDE,MENU

Posttest (identical in content to pretest)

READER'S GUIDE POSTTEST

STUDENT NAME _____
TEACHER _____ PERIOD _____

Please fill out the following request form for an article
about MUFFINS.

ARTICLE _____

MAGAZINE _____ PAGE _____

DATE OF MAGAZINE _____

Please fill out the following request form for an article
about MOZART.

ARTICLE _____

MAGAZINE _____ PAGE _____

DATE OF MAGAZINE _____

Please fill out the following request form for an article
about MUCKRAKING.

ARTICLE _____

MAGAZINE _____ PAGE _____

DATE OF MAGAZINE _____

Please fill out the following request form for an article
about MUSLIMS in AFGHANISTAN.

ARTICLE _____

MAGAZINE _____ PAGE _____

DATE OF MAGAZINE _____

Please fill out the following request form for an article
about FOOD PROBLEMS of SPACE FLIGHT.

ARTICLE _____

MAGAZINE _____ PAGE _____

DATE OF MAGAZINE _____

			APPENDIX F					
The Statistical Analysis								
ANALYSIS OF COVARIANCE USING EXPERIMENTAL DATA								
Group	NO LESSON		T-CENTERED		C-CENTERED			
	PRE.	POST.	PRE.	POST.	PRE.	POST.		
	X	Y	X	Y	X	Y		
9General	10	30	35	75	60	100		
9General	0	5	30	95	5	45		
9General	20	60	60	80	60	85		
9General	5	15	30	100	45	70		
9General	30	75	80	85	85	85		
9General	40	60	40	70	35	75		
9General	35	60	40	80	5	70		
9General	55	65	20	30	0	60		
9General	40	45	35	80	5	25		
9General	75	80	70	75	5	50		
9Average	75	75	75	75	60	80		
9Average	100	100	45	95	65	100		
9Average	75	75	35	60	90	100		
9Average	50	100	60	100	55	100		
9Average	20	50	50	75	75	95		
9Average	45	75	50	100	65	100		
9Average	35	70	80	100	80	90		
9Average	45	60	30	95	50	100		
9Average	30	75	30	95	55	80		
9Average	50	90	50	95	35	100		
9Average	40	90	65	100	35	90		
9Average	30	60	10	65	40	95		
9Average	10	60	40	100	10	100		
9Average	5	25	30	95	10	60		
9Average	35	90	20	100	30	80		
9Average	60	95	45	95	45	75		
9Average	25	50	75	95	35	95		
9Gifted	45	20	65	90	45	80		
9Gifted	45	65	40	30	60	70		
9Gifted	65	90	40	95	80	100		
9Gifted	60	70	50	15	80	100		
9Gifted	60	90	100	100	55	100		
9Gifted	45	55	55	40	45	100		
9Gifted	60	100	60	20	85	95		
9Gifted	75	90	45	85	60	80		
Mean	42.71429	66.14286	48.14286	79.57143	47.14286	83.71429		
Sample Means X=			46	Sample Means Y=			76.47619	

(X - MEAN of X) ^2			(X - MEAN of X)* (Y - MEAN of Y)			(Y - MEAN of Y) ^2		
1070.225	172.7348	165.306	1182.388	60.08163	209.3877	1306.306	20.89797	265.2244
1824.511	329.1634	1776.021	2611.673	-279.918	1631.531	3738.449	238.0408	1498.796
515.939	140.5918	165.306	139.5306	5.081633	16.53055	37.73473	0.183672	1.65305
1422.368	329.1634	4.591849	1928.816	-370.633	29.3878	2615.592	417.3265	188.0818
161.6532	1014.877	1433.163	-112.612	172.9388	48.6733	78.44893	29.46937	1.65305
7.36737	66.30617	147.449	16.67347	77.93878	105.8164	37.73473	91.61227	75.93885
59.51027	66.30617	1776.021	47.38776	-3.4898	577.9594	37.73473	0.183672	188.0818
150.9387	792.0206	2222.449	-14.0408	1395.082	1117.959	1.306129	2457.327	562.3676
7.36737	172.7348	1776.021	57.38776	-5.63265	2474.388	447.0205	0.183672	3447.368
1042.367	477.7346	1776.021	447.3878	-99.9184	1420.817	192.0203	20.89797	1136.653
1042.367	721.306	165.306	285.9592	-122.776	-47.7551	78.44893	20.89797	13.79595
3281.653	9.877569	318.8774	1939.531	-48.4898	290.8162	1146.306	238.0408	265.2244
1042.367	172.7348	1836.734	285.9592	257.2245	697.959	78.44893	383.0409	265.2244
53.08157	140.5918	61.73465	246.6735	242.2245	127.9591	1146.306	417.3265	265.2244
515.939	3.448969	776.0202	366.6735	-8.4898	314.3876	260.5919	20.89797	127.3673
5.22447	3.448969	318.8774	20.2449	37.93878	290.8162	78.44893	417.3265	265.2244
59.51027	1014.877	1079.592	-29.7551	650.7959	206.5305	14.87753	417.3265	39.51015
5.22447	329.1634	8.163249	-14.0408	-279.918	46.53055	37.73473	238.0408	265.2244
161.6532	329.1634	61.73465	-112.612	-279.918	-29.1837	78.44893	238.0408	13.79595
53.08157	3.448969	147.449	173.8163	28.65306	-197.755	569.1631	238.0408	265.2244
7.36737	284.1632	147.449	-64.7551	344.3673	-76.3265	569.1631	417.3265	39.51015
161.6532	1454.878	51.02045	78.10204	555.7959	-80.6122	37.73473	212.3266	127.3673
1070.225	66.30617	1379.592	200.9592	-166.347	-604.898	37.73473	417.3265	265.2244
1422.368	329.1634	1379.592	1551.673	-279.918	880.8166	1692.735	238.0408	562.3676
59.51027	792.0206	293.8776	-184.041	-574.918	63.67355	569.1631	417.3265	13.79595
298.7958	9.877569	4.591849	498.8163	-48.4898	18.6735	832.7345	238.0408	75.93885
313.7961	721.306	147.449	285.9592	414.3673	-137.041	260.5919	238.0408	127.3673
5.22447	284.1632	4.591849	-105.469	175.7959	7.959203	2129.164	108.7551	13.79595
5.22447	66.30617	165.306	-2.61224	403.6531	-176.327	1.306129	2457.327	188.0818
496.6529	66.30617	1079.592	531.6735	-125.633	535.1019	569.1631	238.0408	265.2244
298.7958	3.448969	1079.592	66.67347	-119.918	535.1019	14.87753	4169.47	265.2244
298.7958	2689.163	61.73465	412.3878	1059.367	127.9591	569.1631	417.3265	265.2244
5.22447	47.02037	4.591849	-25.4694	-271.347	-34.898	124.1633	1565.898	265.2244
298.7958	140.5918	1433.163	585.2449	-706.347	427.2447	1146.306	3548.755	127.3673
1042.367	9.877569	165.306	770.2449	-17.0612	-47.7551	569.1631	29.46937	13.79595
Within group sum of squares of X			Within grp. sum of squares for cross product X and Y			Within group sum of squares of Y		
Exx= 54935.71			Exy= 26910			Eyy= 53490		

(X 1)- MEAN of X1)^2			(X 2)- MEAN of X2)^2			(X3) - MEAN of X3)^2		
1070.225			172.7348			165.306		
1824.511			329.1634			1776.021		
515.939			140.5918			165.306		
1422.368			329.1634			4.591849		
161.6532			1014.877			1433.163		
7.36737			66.30617			147.449		
59.51027			66.30617			1776.021		
150.9387			792.0206			2222.449		
7.36737			172.7348			1776.021		
1042.367			477.7346			1776.021		
1042.367			721.306			165.306		
3281.653			9.877569			318.8774		
1042.367			172.7348			1836.734		
53.08157			140.5918			61.73465		
515.939			3.448969			776.0202		
5.22447			3.448969			318.8774		
59.51027			1014.877			1079.592		
5.22447			329.1634			8.163249		
161.6532			329.1634			61.73465		
53.08157			3.448969			147.449		
7.36737			284.1632			147.449		
161.6532			1454.878			51.02045		
1070.225			66.30617			1379.592		
1422.368			329.1634			1379.592		
59.51027			792.0206			293.8776		
298.7958			9.877569			4.591849		
313.7961			721.306			147.449		
5.22447			284.1632			4.591849		
5.22447			66.30617			165.306		
496.6529			66.30617			1079.592		
298.7958			3.448969			1079.592		
298.7958			2689.163			61.73465		
5.22447			47.02037			4.591849		
298.7958			140.5918			1433.163		
1042.367			9.877569			165.306		
Within group sum of sqs. of X 1			Within group sum of sqs. of X 2			Within group sum of sqs. of X 3		
Exx1 18267.14			Exx2 13254.29			Exx3 23414.29		
The within class regression coefficients for each group are as follows:								
bw1 = Exy1/Exx1=			0.77004					
bw2 = Exy2/Exx2=			0.156338					
bw3 = Exy3/Exx3=			0.460037					

The sum of squared deviations about the within class regression lines:

bwi	bwi ²	(bwi ²)*Exxi
0.77004	0.592961	10831.71
0.156338	0.024441	323.9538
0.460037	0.211634	4955.251
SUM ((bwi ²)*Exxi) =		16110.92

$$S1 = Eyy - \text{SUM} ((bwi^2) * Exxi) = 37379.08$$

where $l = 1, 2, 3$

$$F = [(Eyy(ad) - S1) / (k-1)] / [S1 / (N-2k)]$$

$$= \frac{2929.179}{2} \text{ divided by } \frac{37379.08}{99}$$

$$= 1464.589 \text{ divided by } 377.5665$$

$$= 3.879024$$

Given this F-value, there is no reason to reject the hypothesis of homogeneity of regression (at $\alpha = .10$, $F_{2,99} = 4.86$).

Test for the regression coefficient being nonzero

$$F = Exy^2(N-k-1) / (Eyy Exx - Exy^2)$$

$$= (26910^2)(101) / ((53490)*(54935.7) - (26910^2)) = 33.02935$$

Given this F-value, the hypothesis that the regression coefficients are zero is rejected (at $\alpha = .05$, $F_{1, 101} = 3.94$) and the model is consistent with the observed data.

The F-ratio indicates that significant differences in the variable exist. It does not indicate between which groups these differences occur. The adjusted group means are now calculated to assist in the interpretation of the results--to see which groups have significant differences.

The pooled within class regression coefficient

$$b_w = E_{xy} / E_{xx} = 0.489845$$

The adjusted group means

$$\begin{aligned} \text{mean } Y_1 (\text{adj}) &= \text{mean } Y_1 - b_w (\text{mean } X_1 - \text{mean } X) = \\ &= 66.14286 - 0.48985(42.71429 - 46) = 67.75235 \end{aligned}$$

$$\begin{aligned} \text{mean } Y_2 (\text{adj}) &= \text{mean } Y_2 - b_w (\text{mean } X_2 - \text{mean } X) = \\ &= 79.57143 - 0.48985(48.14286 - 46) = 78.52176 \end{aligned}$$

$$\begin{aligned} \text{mean } Y_3 (\text{adj}) &= \text{mean } Y_3 - b_w (\text{mean } X_3 - \text{mean } X) = \\ &= 83.71429 - 0.48985(47.14286 - 46) = 83.15446 \end{aligned}$$

The comparison of group 3 (computer-centered) with group 2 (teacher-centered) using the t-statistic.

$$t = \frac{\sum_{i=1}^3 c_i Y(\text{adj})}{\text{MSE}(\text{adj}) \left[\sum_{i=1}^3 \frac{c_i^2}{n_i} + \frac{\left(\sum_{i=1}^3 c_i (X_i - \bar{X}) \right)^2}{E_{xx}} \right]}$$

$$= \frac{(0)(67.7523) + (+1)(78.5218) + (-1)(83.1545)}{40308.26 / 101 \left[\frac{1}{35} + \frac{1}{35} + \frac{[(1)(48.14286 - 46) + (-1)(47.14286 - 46)]^2}{54935.71} \right]}$$

$$= -0.96995$$

The null hypothesis, that there is no significant difference between the computer-taught group and the teacher-taught group cannot be rejected for this calculated t-value ($t_{.05;101} = 1.986$). There is no significant difference shown between the two groups.

The comparison of group 3 (computer-centered) with group 1 (control) using the t-statistic.

$$= \frac{(+1)(67.7523) + (0)(78.5218) + (-1)(83.1545)}{\sqrt{\frac{40308.26}{101} + \frac{1}{35} + \frac{1}{35} + \frac{+[(1)(42.71429-46) + (-1)(47.14286 - 46)]^2}{54935.71}}}$$

$$= -3.21524$$

The null hypothesis, that there is no significant difference between the computer-taught group and the control group can be rejected for this calculated t-value ($t_{.05;101} = 1.986$). There is a significant difference shown between these two groups.

The comparison of group 2 (teacher-centered) with group 1 (control) using the t-statistic.

$$= \frac{(+1)(67.7523) + (-1)(78.5218) + (0)(83.1545)}{\sqrt{\frac{40308.26}{101} + \frac{1}{35} + \frac{1}{35} + \frac{+[(1)(42.71429-46) + (-1)(48.14286 - 46)]^2}{54935.71}}}$$

$$= -2.24465$$

The null hypothesis, that there is no significant difference between the teacher-taught group and the control group can be rejected for this calculated t-value ($t_{.05;101} = 1.986$). There is a significant difference shown between these two groups.

BIOGRAPHICAL SKETCH

Theresa Toohil was born in New York City in 1937. Ms. Toohil earned her B.S. in Mathematics from Queens College in 1957, her M.A. in the Teaching of Mathematics from Teachers College, Columbia University in 1961, and her M.L.S. from Palmer Graduate Library School, Long Island University. Ms. Toohil is married to John Toohil and is the mother of two children.

Ms. Toohil has managed libraries in secondary schools for the past 18 years. During this time, her main objective was the effective integration of computers with the educational curriculum. She would now like to target her efforts toward those who are entering the field of education.

I certify that I have read and am willing to sponsor this dissertation submitted by Theresa K. Toohil. In my opinion it conforms to acceptable standards and is fully adequate in scope and quality as a dissertation for the degree of Doctor of Science at Nova University.

12/16/91
(date)

Markus Kessel-Litman
NAME OF ADVISOR
Dissertation Advisor

I certify that I have read this dissertation and in my opinion it conforms to acceptable standards for a dissertation for the degree of Doctor of Science at Nova University.

12/16/91
(date)

George K. L. L. L.
NAME OF ADVISOR
Local Committee Member

This dissertation was submitted to the Central Staff of the Center For Computer Information Sciences of Nova University and is acceptable as partial fulfillment of the requirements for the degree of Doctor of Science.

1/8/92
(date)

Patricia B. Kistenmacher
NAME OF ADVISOR
Central Staff Committee Member